ORDER NO. MKE0304102C1

D1

Service Manual

Combination VCR

AG-513F / AG-520F

SPECIFICATIONS

ITEM		SPECIFICATION	1	3
VCR	Video	Head: 4 rotary heads helical scanning system	○	○
		Input Level: VIDEO IN Jack (Phono type) 1.0 Vp-p 75 Ω unbalanced Output Level: VIDEO OUT Jack (Phono type) 1.0 Vp-p 75 Ω unbalanced Signal-to-Noise Ratio: SP: more than 43 dB LP/SLP: more than 41 dB Horizontal Resolution: Color/Monochrome: more: SP: 230 lines LP/SLP: 220 lines	○	○
	Audio	Head: Normal Mono: 1 stationary head	○	○
		Input Level: AUDIO IN Jack (Phono type) -10 dBv 50 kΩ unbalanced	○	○
		Frequency Response: Normal Mono: SP: 100 Hz-8 kHz LP: 100 Hz-6 kHz SLP: 100 Hz-5 kHz	○	○
		Signal-to-Noise Ratio: Normal Mono: SP: more than 42 dB LP/SLP: more than 40 dB	○	○
		Wow and Flutter: Normal Mono: SP: Less than 0.2 % WRMS LP: Less than 0.3 % WRMS SLP: Less than 0.4 % WRMS	○	○
	Tuner	Broadcast Channels: VHF 2~13, UHF 14~69 CABLE Channels: Midband A through I (14~22) Superband J through W (23~36) Hyperband AA~EEE (37~64) Lowband A-5~A-1 (95~99) Special CABLE channel 5A (01) Ultraband 65~94, 100~125	○	○

ITEM		SPECIFICATION	1	2
VCR	Tape Speed	SP: 1-5/16 i.p.s (33.35 mm/s), LP: 21/32 i.p.s (16.67 mm/s), SLP: 7/16 i.p.s (11.12 mm/s) Record/Playback Time: 8 hr. with 160 min. type tape used in SLP mode FF/REW Time: Less than 2-1/2 min. (120 min. type tape) *Note: FF/REW Time may be exceed specification according to tape condition.	○	○
	Tape Format	Tape width 12.7 mm (1/2 inch) high density tape	○	○
DISPLAY	Picture Tube	13 inch measured diagonal 90° deflection Picture Tube 20 inch measured diagonal 90° deflection Picture Tube	○ –	– ○
GENERAL	Power	Source: 120 V AC±12 V AC, 60 Hz±3 Hz	○	○
		Consumption: Approx. 69 W (Power on), Approx. 2.5 W (Power off) Approx. 110 W (Power on), Approx. 2.5 W (Power off)	○ –	– ○
	Television System	EIA Standard (525 lines, 60 fields) NTSC Color Signal	○	○
	Operating Condition	5 °C-40 °C (41 °F-104 °F) (Temperature) 10 %-75 % (Humidity)	○	○
	Dimension (W x H x D)	386 mm x 385 mm x 374 mm (15-3/16 inch x 15-3/16 inch x 14-3/4 inch) 515 mm x 505 mm x 474 mm (20-5/16 inch x 19-7/8 inch x 18-11/16 inch)	○ –	– ○
	Weight	12 kg (26.4 lbs.) 23 kg (50.6 lbs.)	○ –	– ○
	Solder	This model uses lead free solder (PbF).	○	○

1. AG-513F
2. AG-520F

Weight and dimensions shown are approximate.
Designs and specifications are subject to change without notice.

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⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

1. SAFETY PRECAUTIONS

GENERAL GUIDELINES

1. IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Layout, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.

2. An Isolation Transformer should always be used during the servicing of Combination VCR whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal

injury from electrical shocks. It will also protect Combination VCR from being damaged by accidental shorting that may occur during servicing.

3. **When servicing, observe the original lead dress, especially the lead dress in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.**
4. **After servicing, see to it that all the protective devices such as insulation barriers, insulation papers, shield, and isolation R-C combinations are properly installed.**
5. **Before turning the receiver on, measure the resistance between B+ line and chassis ground. Connect (-) side of an ohmmeter to the B + lines, and (+) side to chassis ground. Each line should have more resistance than specified, as follows :**
   (For model with 13 inch CRT)

B+ Line
Minimum Resistance

130.0 V
1 k Ω (Cold chassis ground)

23.5 V
180 Ω (Cold chassis ground)

13.0 V
110 Ω (Cold chassis ground)
(For model with 20 inch CRT)

B+ Line
Minimum Resistance

130.0 V
1 k Ω (Cold chassis ground)

21.5 V
180 Ω (Cold chassis ground)

15.9 V
110 Ω (Cold chassis ground)

6. **When the TV set is not used for a long period of time, unplug the**

power cord from the AC outlet.

7. **Potentials, as high as 25.0 kV (For model with 13 inch CRT) or 30.0 kV (For model with 20 inch CRT) are present when this TV set is in operation. Operation of the TV set without the rear cover involves the danger of a shock hazard from the TV set power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to the CRT ground of receiver before handling the tube.**
8. **After servicing make the following leakage current checks to prevent the customer from being exposed to shock hazards.**

LEAKAGE CURRENT COLD CHECK

1. **Unplug the AC cord and connect a jumper between the two prongs on the plug.**
2. **For physically operated power switches, turn power on. Otherwise skip step 2.**
3. **Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the receiver, such as screwheads, connectors, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1 M Ω and 12 M Ω . When the exposed metal does not have a return path to the chassis, the reading must be infinity.**

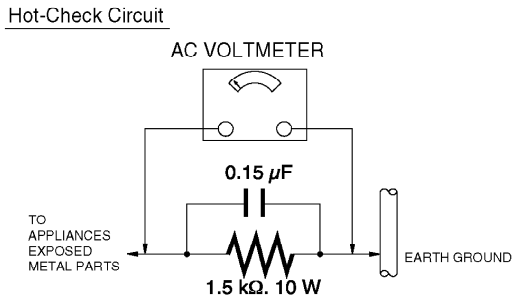
LEAKAGE CURRENT HOT CHECK

1. **Plug the AC cord directly into the AC outlet.**
   Do not use a isolation transformer for this check.
2. **Connect a 1.5 k Ω , 10 W resistor, in parallel with a 0.15 μ F capacitor, between each exposed metallic part on the set and a good earth ground , as shown in Figure 1.**
3. **Use an AC voltmeter, with 1 k Ω /V or more sensitivity, to measure the potential across the resistor.**
4. **Check each exposed metallic part, and measure the voltage at each point.**
5. **Reverse the AC plug in the AC outlet and repeat each of the above**

measurements.

6. **The potential at any point should not exceed 0.75 V RMS.**
   A leakage current tester (Simpson Model 229 equivalent) may be used to make the hot checks. Leakage current must not exceed 1/2 mA. In case a measurement is outside of the limits specified, there is a possibility of shock hazard, and the receiver should be repaired and rechecked before it is returned to the customer.

Figure 1



2. X-RADIATION

WARNING :

1. **The potential source of X-Radiation in TV sets is the High Voltage section and the picture tube.**
2. **When using a picture tube test fixture for service, ensure that the fixture is capable of handling 25.0 kV (For model with 13 inch CRT) or 30.0 kV (For model with 20 inch CRT) without causing X-Radiation.**

NOTE :

It is important to use an accurate periodically calibrated high voltage meter.

1. **Reduce the brightness to minimum.**
2. **Set the SERVICE switch to SERVICE .**
3. **Measure the High Voltage. The meter reading should indicate 23.5 kV±1.5 kV (For model with 13 inch CRT) or 28.5 kV±1.5 kV (For model with 20 inch CRT).**
   If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure.

4. To prevent an X-Radiation possibly, it is essential to use the specified picture tube.

HORIZONTAL OSCILLATOR DISABLE CIRCUIT TEST

SERVICE WARNING :

The test must be made as a final check before set is returned to the customer.

1. With the rear cover removed, supply about a 90 V AC power source to the set, turn on the set.
2. Set the customer controls to normal operating positions.
3. Short both sides of R804 on the Main circuit board with a jumper wire. Confirm that the picture goes out of horizontal sync.
4. If this does not occur, the horizontal oscillator disable circuit is not operating. Follow the Repair Procedures of horizontal oscillator disable circuit before the set is returned to customer.

REPAIR PROCEDURES OF HORIZONTAL OSCILLATOR DISABLE CIRCUIT

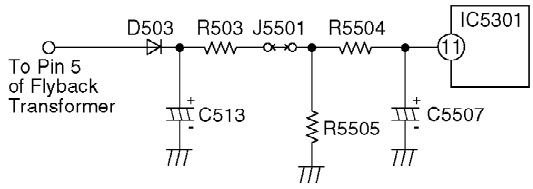
1. Connect a DC voltmeter between capacitor C513 (+) on the Main circuit board and chassis ground.
2. If approximately +21.0 V (For model with 13 inch CRT) or +21.9 V (For model with 20 inch CRT) is not present at that point when 120 V AC is applied, find the cause. Check R518 (For model with 20 inch CRT), R503, R5504, R5505, D503, C513, C5507 and J5501.
3. Carefully check above specified parts and related circuits and parts. When the circuit is repaired, try the horizontal oscillator disable circuit test again.

CIRCUIT EXPLANATION

HORIZONTAL OSCILLATOR DISABLE CIRCUIT

The positive DC voltage, supplied from the D503 cathode for monitoring high voltage, is applied to the IC5301 Pin11 through R503 and R5504. Under normal conditions, the voltage at IC5301 Pin 11 is less than approx 3 V. If the high voltage at Flyback Tr Pin 5 exceeds the specified voltage, the positive DC voltage which is supplied from the D503 cathode also increases. The increased voltage is applied to IC5301 Pin11 through R503 and R5504. Due to the increased voltage at IC5301 Pin11, the horizontal oscillator frequency increases, the picture goes out of horizontal sync, the beam current decreases and the picture becomes dark in order to keep X-radiation under specification.

Figure 2



3. PREVENTION OF ELECTROSTATIC DISCHARGE (ESD) TO ELECTROSTATICALLY SENSITIVE (ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors are semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by electrostatic discharge (ESD).

1. **Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.**
2. **After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.**
3. **Use only a grounded-tip soldering iron to solder or unsolder ES devices.**
4. **Use only an antistatic solder removal device. Some solder removal devices not classified as "antistatic (ESD protected)" can generate electrical charge sufficient to damage ES devices.**
5. **Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.**
6. **Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).**
7. **Immediately before removing the protective material from the**

leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION:

Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. **Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device).**

"NOTE to CATV system installer :
This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical."

4. ABOUT LEAD FREE SOLDER (PbF)

Distinction of PbF PCB:

PCBs (manufactured) using lead free solder will have a PbF stamp or printing on the PCB.
(Please refer to figures.)

Printed case

Stamped case

CAUTION:

- Pb free solder has a higher melting point than standard solder;
  Typically the melting point is 50 °F - 70 °F (30 °C - 40 °C) higher.
  Please use a soldering iron with temperature control and adjust it to 700 °F±20 °F (370 °C± 10 °C).
  In case of using high temperature soldering iron, please be carefull not to heat too long.
- Pb free solder will tend to splash when heated too high (about 1100 °F/600 °C).
- All products with the printed circuit board with PbF stamp or printing must be serviced with lead free solder.
  When soldering or unsoldering, completely remove all of the solder from the pins or solder area,
  and be sure to heat the soldering points with the lead free solder until it melts sufficiently.

Recommendations

Recommended lead free solder composition is Sn96.5 Ag3.0 Cu0.5.

5. SERVICE NOTES (PLEASE READ)

5.1. SERVICE NOTES

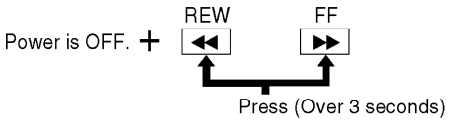
5.1.1. SIMPLIFIED FAULT FINDING DATA

Simplified Self-Diagnostic System facilitates finding the cause of the fault. A 4 digit for fault code and communication for I2C bus code will be displayed on TV screen.
The Simplified Fault finding data is stored in the Memory IC (IC6004). This data is cleared after it is displayed, and then the POWER button is pressed back on.

1. With power turned off, press FF and REW buttons on unit

together for over 3 seconds.

Fig. 1-1



2. TV power goes on and the unit goes into service mode. 4 digit for fault code and communication for I2C bus code will be displayed.

Fig. 1-2

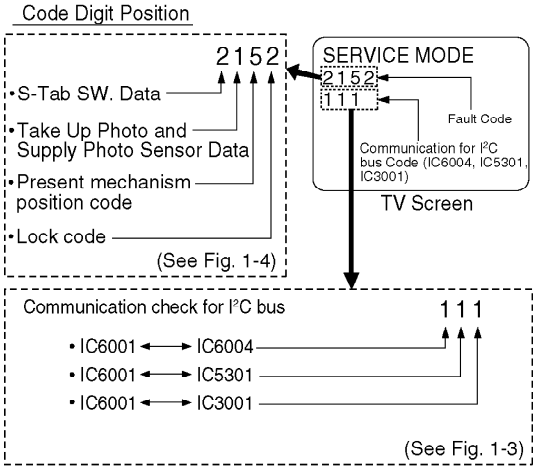


Fig. 1-3

(Communication check for I²C bus)

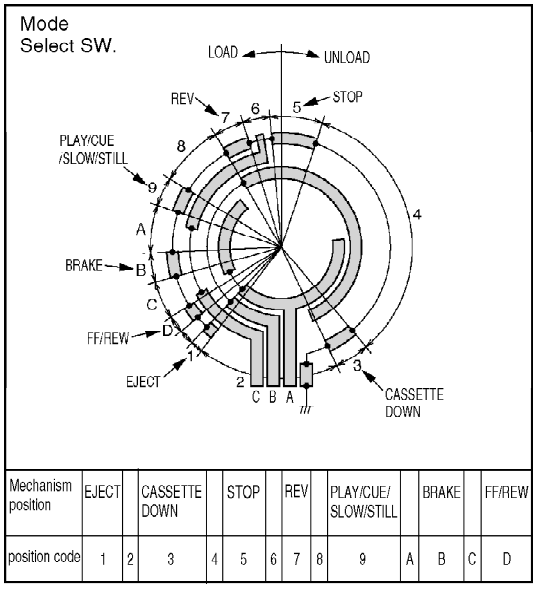
Explanation of Codes	Code No.			
Communication check for I²C bus (IC6001◄►IC6004) ----- **NG**	0			
OK	1			
Communication check for I²C bus (IC6001◄►IC5301) ----- **NG**		0		
OK		1		
Communication check for I²C bus (IC6001◄►IC3001) ----- **NG**			0	
OK			1	

Fig. 1-4

(Fault Code)

Explanation of Codes	Code No.			
S-Tab SW. Data • S-Tab SW. is off. • S-Tab SW. is on.	1 2			
Take Up and Supply Photo Sensor Data • No light detected at either sensor. • Take Up Photo Sensor detected at beginning of tape. • Supply Photo Sensor detected at end of tape. • Light detected at both sensors.		1 2 3 4		
Present Mechanism Position Code Mechanism Position is indicated. (Refer to Fig. 1-5.)			1 2 3 4 5 6 7 8 9 A B C D	
Lock Code (See Note) • VCR is not in shut-off condition. • Reel lock. • Cylinder lock. • Exceeds loading/unloading time. (Mechanism Lock) • Exceeds Cassette loading/unloading time. (Cassette Lock) Tape Unloading (direction) Tape Loading (direction)			 1 2	0 1 2 3 4 4

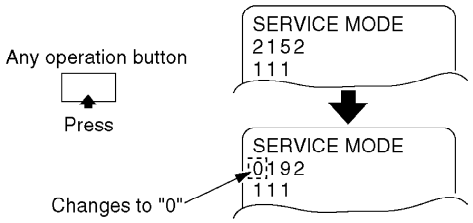
Fig. 1-5



Mechanism position	EJECT		CASSETTE DOWN		STOP		REV		PLAY/CUE/ SLOW/STILL		BRAKE		FF/REW
position code	1	2	3	4	5	6	7	8	9	A	B	C	D

3. Press any operation button except for POWER on either the unit, or the remote to detect that a key has been pressed. The 1st digit changes to "0" only when key is detected.

Fig. 1-6



Note:

When 1 to 4 listed in Lock code occurs, the VCR stops and all VCR function buttons except for power become non-operational.

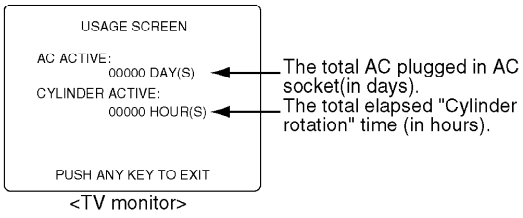
5.1.2. USAGE SCREEN MODE

Function displayed on the TV monitor:

- the total AC plugged in AC socket (in days))
- the total elapsed "Cylinder rotation" time (in hours)

1. With power turned on and no cassette, press STOP/EJECT button on unit and 7 key on remote together.
The USAGE SCREEN will be displayed on the TV Monitor.

Fig. 1-7



<TV monitor>

Note:

1. After replacing the Cylinder Unit, press COUNTER RESET button on remote in this mode. Only Total elapsed "Cylinder rotation" time (in hours) will be cleared to 0.

2. To release from Usage Screen Mode, press any operation button on unit or insert a cassette tape in this mode. The unit will return to normal operation mode.

5.1.3. SERVICE POSITION

5.1.3.1. Service Position

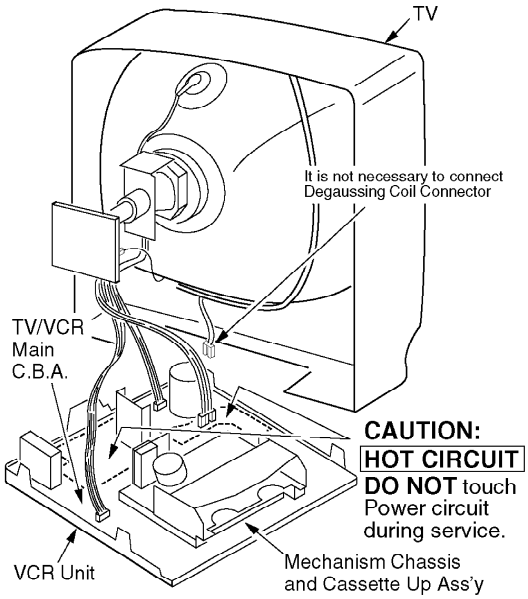
Service Position	Purpose
Service Position (1)	Mechanism check Mechanical adjustment Electrical adjustment
Service Position (2)	TV/VCR Main C.B.A. check

CAUTION:

HOT CIRCUIT (Primary circuit) exists on the TV/VCR Main C.B.A. Use extreme care to prevent accidental shock when servicing.

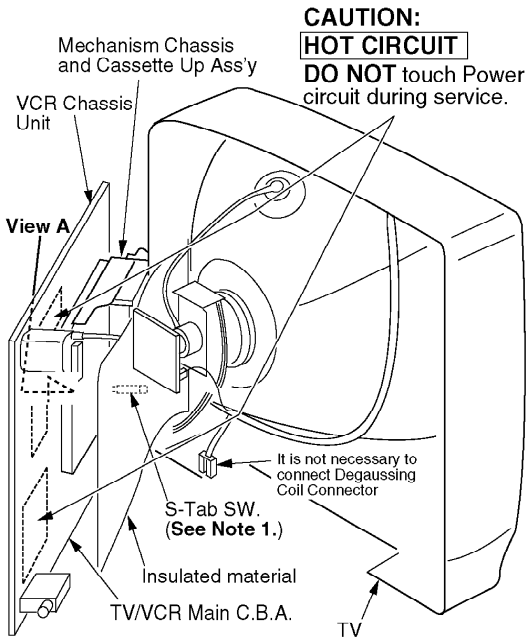
5.1.3.2. Service Position (1)

Fig. 2-1



5.1.3.3. Service Position (2)

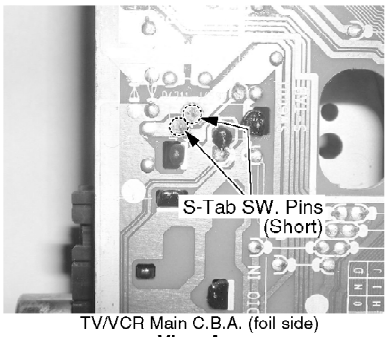
Fig. 2-2



Note:

1. It is possible that the S-Tab SW. may not work correctly in Service Position (2). (Recording can not be done). In this case, short the S-Tab SW. Pins on the foil side of the TV/VCR Main C.B.A. to turn this SW. on.

Fig. 2-3



TV/VCR Main C.B.A. (foil side)

View A

Alternative method:
Cover the S-Tab SW. with masking tape.

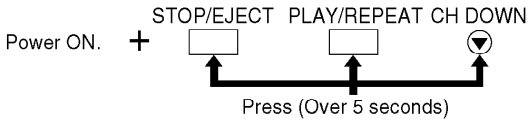
5.1.4. HOT CIRCUIT

Primary circuit exists on the TV/VCR Main C.B.A.
This circuit is identified as "HOT" on the C.B.A. and in the Service Manual. Use extreme care to prevent accidental shock when servicing.

5.1.5. SERVICE MODE

In order to inhibit detection of the Supply & Takeup Photo Transistors, Reel Sensor, and Cylinder Lock, press and hold STOP/EJECT, PLAY/REPEAT, and CH DOWN buttons on the unit together over 5 seconds in power on condition.

Fig. 3



The unit goes into service mode.
In this mode, Mechanism movement can be confirmed. When removing Cassette Up Ass'y, it can be confirmed without a cassette.
To release from this mode, press POWER button off or disconnect AC Plug.

5.1.6. DEFEATING THE AUTO TRACKING

To defeat the Auto Tracking Function, place the instrument in the STOP mode and place a jumper between TP6003 and TP6009 on the TV/VCR Main C.B.A. The tracking will be placed in the neutral position.

5.1.7. CAUTION FOR INSTALLATION OF VCR UNIT

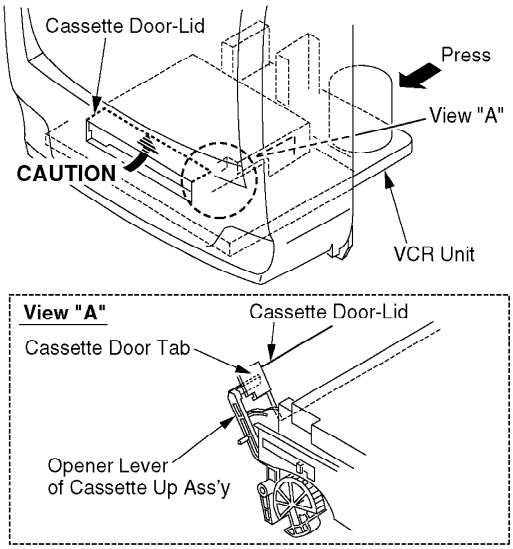
CAUTION:

Opener Lever may be damaged when VCR Unit is installed, with Cassette Door-Lid and Opener Lever of Cassette Up Ass'y set incorrectly.

Install the VCR Unit as follows:

1. **Swing the Cassette Door-Lid all the way open until the Cassette Door tab clears the Opener Lever.**
2. **Make sure that all guide tabs are aligned properly. Then, press the VCR Unit straight in.**

Fig. 4

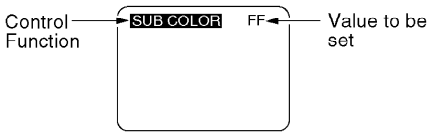


5.1.8. HOW TO INITIALIZE MEMORY IC

After the Memory IC (IC6004) or TV/VCR Main C.B.A. is replaced, be sure to set the Default value to Memory IC as shown in "Memory IC Reference Table" below.

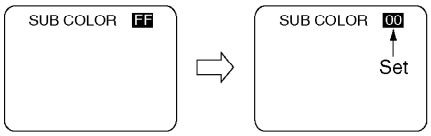
1. **Press and hold STOP, PLAY, and VOL- buttons on the unit together over 5 seconds with no cassette inserted.**
   The adjustment overlay will appear to Enter EVR Adjustment mode.

Fig. 5-1



2. **Press ACTION key on the remote and VOL- button of operation panel on the unit together. The overlay color will be changed from red to green. (All Control functions are displayed.)**
3. **Set the Default value of all Control functions using a remote control as shown in "Memory IC Reference Table."**
   Note:
   For Selecting Control functions and setting Default value, refer to " How to adjust:" of How to enter EVR adjustment mode in ADJUSTMENT PROCEDURES.

Fig. 5-2



4. Press and hold STOP, PLAY, and VOL- buttons on the unit together over 5 seconds again or press the POWER button OFF to release EVR Adjustment mode.
The Default value will be written to Memory IC (IC6004).

5. Perform all EVR Adjustments. (Refer to "EVR (Electronic Variable Register) ADJUSTMENT WITH THE REMOTE CONTROL" of ELECTRICAL ADJUSTMENT in ADJUSTMENT PROCEDURES.)

Memory IC Reference Table

Control functions	Address	Range	Default
SUB COLOR	00	C0 - FF, 00 - 3F	**00**
SUB TINT	01	E0 - FF, 00 - 1F	**00**
SUB BRIGHT	02	C0 - FF, 00 - 3F	**DE**
CONTRAST	03	C1 - FF, 00	**00**
SUB SHARPNESS	04	E0 - FF, 00 - 1F	**F0**
R CUT -OFF	05	00 - 7F	**1E**
G CUT -OFF	06	00 - FD	**3C**
B CUT -OFF	07	00 - FD	**3C**
G DRIVE	08	00 - 7F	**40**
B DRIVE	09	00 - 7F	**40**
SUB CONTRAST	0A	00 - 0F	**06**
H-CENTER	0B	00 - 0F	**08**
V SIZE	0D	00 - 7F	**40**
V POSITION	0E	00 - 1F	**03**
ANR	10	00 - FD	**89**
PIC	11	00 - FD	**86**
VV COLOR	12	00 - FF	**00**
VV TINT	13	00-FF	**00**
VV SHARPNESS	14	00-FF	**F8**
PG SHIFTER	15	01 - FD	**80**
FM ANT	18	00 - 01	**00**

Note:
1. Address is not displayed on the TV screen.
   Other Addresses except above are not used.

5.1.9. METHOD FOR LOADING/UNLOADING OF MECHANISM

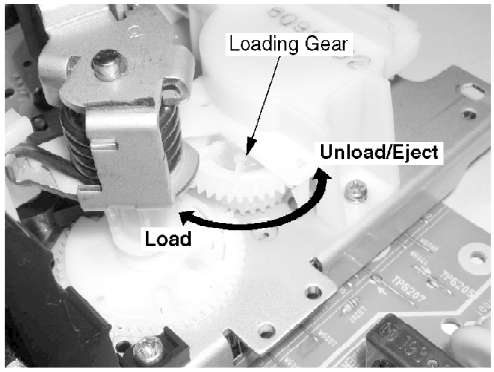
5.1.9.1. (Manual Method)

Turn the Loading Gear clockwise (for loading) or counterclockwise (for unloading) using needlenose pliers etc.

Note:

Do not use this method if Mechanism is jammed or locked.

Fig. 6-1



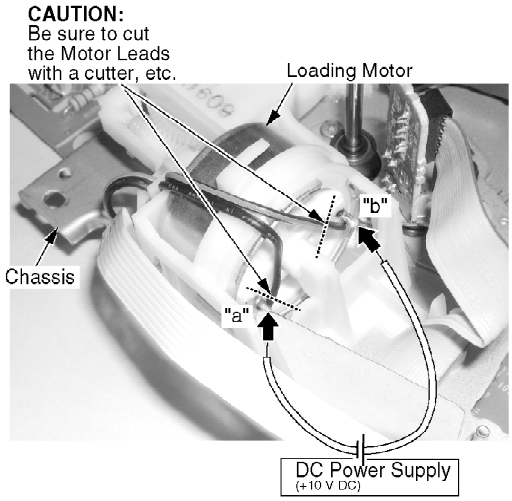
5.1.9.2. (Electrical Method)

Apply +10.0 V DC Power Supply to the Loading Motor terminals.
Loading
DC + to Portion "a," DC - to Portion "b"
Unloading
DC - to Portion "a," DC + to Portion "b"

CAUTION:

Before applying DC Power Supply, be sure to cut the Motor Leads with a cutter, etc.
Otherwise, the Loading Motor Drive IC (IC2501) may be damaged.

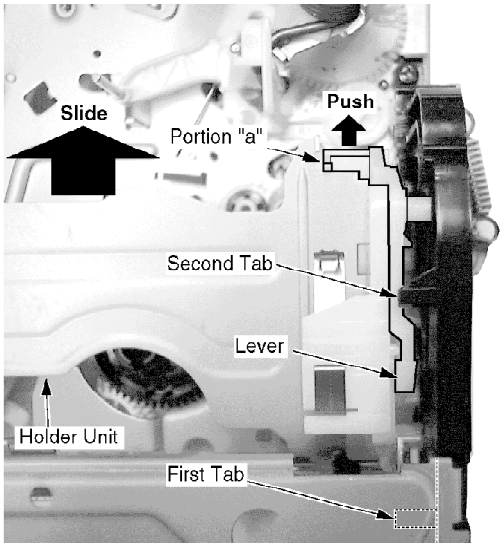
Fig. 6-2



5.1.9.2.1. WHEN LOADING WITHOUT A CASSETTE

When loading without a cassette, push Portion "a" on the Holder Unit of Cassette Up Ass'y so that the Lever clear the First Tab and Second Tab.

Fig. 6-3



5.1.10. HOW TO REMOVE A JAMMED TAPE

CAUTION:

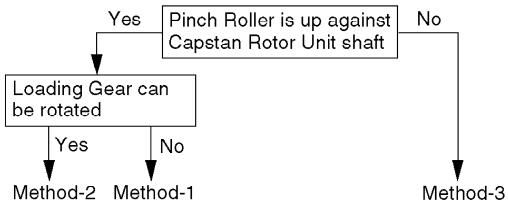
Wiper Arm Unit may be damaged or its spring may be out of place when the jammed tape is removed by force.

Remove a jammed tape as follows:

5.1.10.1. Manual Method

When a tape jam is encountered, check the tape loading condition and use the following procedure to remove a tape jam.

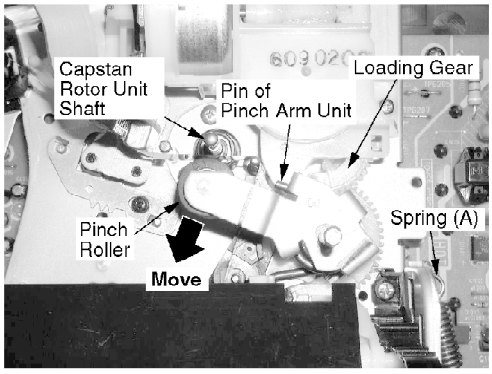
Fig. 7-1



5.1.10.1.1. Method -1:

1. **Move the Pinch Roller Unit out by unhooking the Pin of Pinch Arm Unit so that the Pinch Roller is separated from the Capstan Rotor Unit shaft.**

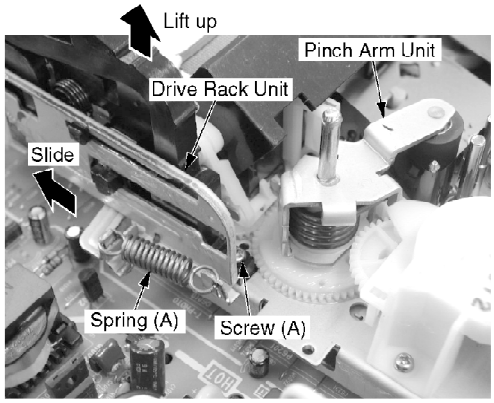
Fig. 7-2



Top View

2. **Remove the tape from the tape path.**
3. **Rewind the tape into the cassette by rotating the Center Clutch Unit counterclockwise.**
4. **Unhook Spring (A) of the Drive Rack Arm.**
5. **Remove Screw (A).**
6. **Lift the Cassette Up Ass'y. While pulling the Cassette Up Ass'y out far enough so that it clears the Drive Rack Arm, slide the Drive Rack Unit as indicated by the arrow to remove the cassette tape from the Cassette Up Ass'y.**
7. **Check the cause of mechanical trouble and repair.**

Fig. 7-3



5.1.10.1.2. Method -2:

1. **Rotate Loading Motor counterclockwise with needlenose pliers, etc. so that the Pinch Roller is separated from the shaft of the Capstan Rotor Unit.**
2. **Perform Step 2 through Step 7 of Method -1.**

5.1.10.1.3. Method -3:

1. Perform Step 2 through Step 7 of Method -1.

Note:

After repairing mechanical trouble, make sure that all gear alignments are correct, especially the Wiper Arm Unit and Drive Rack Unit of Cassette Up Ass'y. (Refer to "EJECT Position Confirmation" in DISASSEMBLY/ASSEMBLY PROCEDURES.)

5.1.10.2. Electrical Method

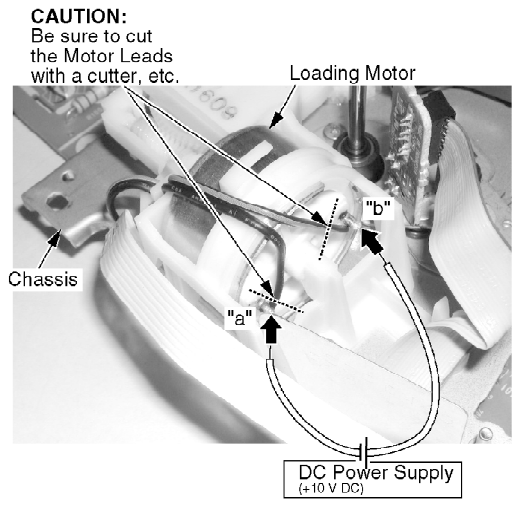
Electrical method can only be performed when the mechanism is moved by rotating the Loading Gear.

CAUTION:

1. **Before applying DC Power Supply, be sure to cut the Motor Leads with a cutter, etc.**
   Otherwise, the Loading Motor Drive IC (IC2501) may be damaged.
2. **If loading does not start in approx. 2 seconds after DC Power Supply is applied, DO NOT continue to apply DC Power Supply. Instead, perform "Manual Method."**

1. **Be sure to cut the Motor Leads with a cutter, etc.**
2. **Apply +10.0 V DC Power Supply to the Loading Motor terminals.**
3. **When the Loading Posts reach the fully unloaded position, remove the Power Supply.**

Fig. 8



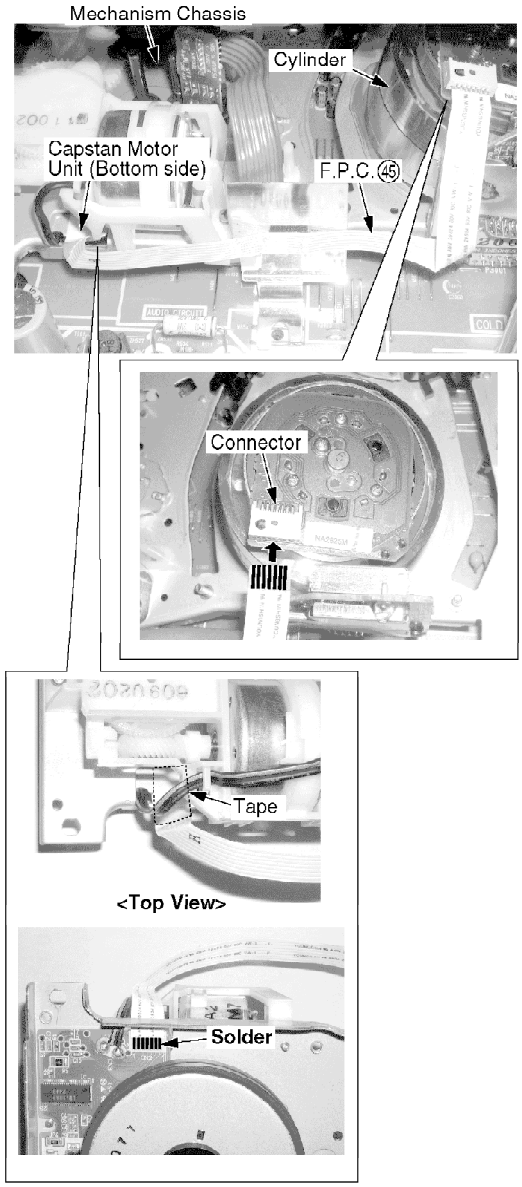
4. **Rewind the tape into the cassette by turning the Center Clutch Unit counterclockwise.**
5. **Eject the cassette by applying +10.0 V DC Power Supply again.**

5.1.11. F.P.C. CONNECTION NOTE

5.1.11.1. F.P.C. between the Capstan Motor and the Cylinder

Be careful with the direction of F.P.C. to connector as shown.

Fig. 9

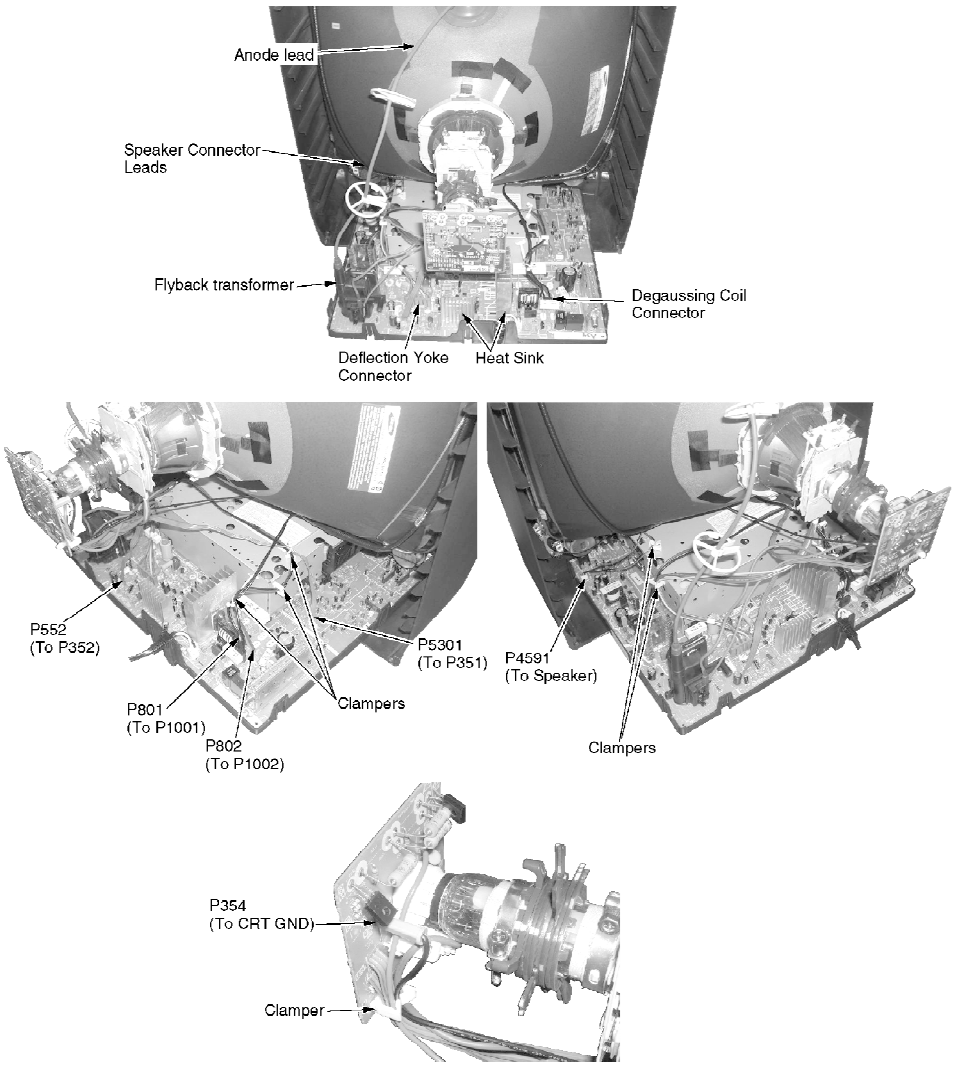


5.1.12. WIRE AND LEAD POSITION DIAGRAM

Fig. 10

After servicing, make sure that all wires, leads, and clampers are placed in their original position. It is important for the best operation of the unit.

Note:
No lead wires or flat cables should touch any heating parts or the Heat Sink Plate.
Use extreme care especially for followings.



5.1.13. HOW TO SET TRACKING TO THE NEUTRAL POSITION

Ejecting the cassette tape and then reinserting it will reset the tracking to the Neutral position.

5.1.14. BLACK SCREWS ON THE CHASSIS

Black Screws are used on the Mechanism Chassis to identify screws that require adjustment.

5.1.15. HOW TO RESET ALL COMBINATION VCR MEMORY FUNCTIONS

To reset (clear) the select language, channel auto set and set clock functions to their initial power on condition (power on, no cassette inserted), hold down the PLAY and FF buttons on the unit together for more than 5 seconds.
Power will shut off.

5.1.16. HOW TO CONFIRM AUTO CLOCK SET FEATURE

1. Connect an RF cable from the output of one unit to the input of

the test unit.

2. Select corresponding RF channels.

3. Playback a recording of P.B.S. channel including clock set data and confirm this feature.

5.1.17. VARIABLE VOLTAGE ISOLATION TRANSFORMER

An Isolation Transformer should always be used during the servicing of Combination VCR whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect Combination VCR from being damaged by accidental shorting that may occur during servicing.
Also, when troubleshooting the above type of Power Supply Circuit, a variable isolation transformer is required in order to increase the input voltage slowly.

5.1.18. SPECIAL NOTE

All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "ELECTROSTATICALLY SENSITIVE (ES) DEVICES" section of this service manual.

5.1.19. MODEL NO. IDENTIFICATION MARK

Use Marks shown in the chart below to distinguish the different models included in this Service Manual.

MODEL	MARK
AG-513F	A
AG-520F	B
Not Used	PT

Note:
Refer to Item 3 of Schematic Diagram Notes of Schematic Diagram and Circuit Board Layout Notes, for mark "PT."

5.2. MAINTENANCE CHART

The following chart indicates the schedule for the periodic maintenance which will prolong the life of the machine.
Since the parts are keyed to the Inner Parts Location Diagram, when you replace the following parts, refer to the diagram.

	Parts Name	Unit or Part No.	Hour									
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000
1	Cylinder Unit	LSEG0069	●	◎	●	◎	●	◎	●	◎	●	●
2	Audio Control Head Unit	LSEH0006	●	●	●	●	●	●	●	◎	●	●
3	Pinch Arm Unit	LSXL0079	●	●	◎	●	●	◎	●	●	◎	●
4	S Reel Table	LSDR0004	●	●	●	●	●	●	●	◎	●	●
5	T Reel Table	LSDR0005	●	●	●	●	●	●	●	◎	●	●
6	S Reel Shaft	————				○				○		
7	T Reel Shaft	————				○				○		
8	Capstan Motor Ass'y	LSEM0078										◎
9	Capstan Shaft	————	●	●	●	●	●	●	●	●	●	●
10	T Brake Unit	VXLS0109				◎				◎		
11	Motor Block Unit	LSXK0094				△				◎		
12	Tape Transport	————	●	●	●	●	●	●	●	●	●	●
13	Loading Post Base-S Unit	VXDS0213				△				△		
14	Loading Post Base-T Unit	VXDS0214				△				△		
15	Drive Rack Arm Kit	LSVD0006				△				△		
16	Capstan Belt	LSDV0009				◎				◎		
17	Tension Arm Unit	VXLS1129				◎				◎		

※ NOTE

Symbol	Maintenance	Requirement	Remark
●	Cleaning	Ethanol or Cleaning Liquid (Purchased Locally)	Wipe dirt from the parts using soft cloth impregnated with Ethanol. Note : When cleaning rubber parts, avoid using excessive alcohol since it may accelerate deterioration of these parts. After cleaning with alcohol, wipe the alcohol away quickly and thoroughly.
◎	Replacement	————	————
○	Lubrication	High Quality Spindle Oil (Purchased Locally)	Supply one or two drops of oil.
△	Greasing	Grease	Wipe away the old grease and apply new grease.

6. DISASSEMBLY/ASSEMBLY PROCEDURES

6.1. CABINET SECTION

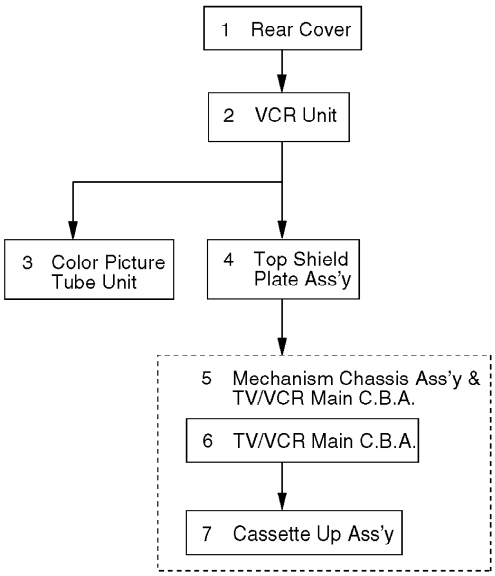
6.1.1. Disassembly Flowchart

Perform all disassembly procedures in the order described in the "Disassembly Flowchart" shown below. When reassembling, use the reverse procedure.

CAUTION:

Disconnect AC plug before disassembly.

Fig. D1


1 Rear Cover
2 VCR Unit
3 Color Picture Tube Unit
4 Top Shield Plate Ass'y
5 Mechanism Chassis Ass'y & TV/VCR Main C.B.A.
6 TV/VCR Main C.B.A.
7 Cassette Up Ass'y

6.1.2. Disassembly Method

STEP No.	Ref. No.	PART	Fig. No.	REMOVE	Note
1	(73)	Rear Cover	D2	6(446), 8(446) (For model with 25 inch CRT)	---
2	-	VCR Unit	D4 D5	Anode Cap, P354, CRT C.B.A., Deflection Yoke Connector, Degaussing Coil Connector, Clampers, P4591, Tabs	1
3	(48)	Color Picture Tube Unit	D2	4(445)	2
4	(91)	Top Shield Plate Ass'y	D3	4(432), (405)	---
5	-	Machanism Chassis Ass'y & TV/VCR Main C.B.A.	D3	2(460), 2(450), Locking Tabs,	3
6	(E10)	TV/VCR Main C.B.A.	D3	P3001, P6201, P4001, P4092	4
7	(61)	Cassette Up Ass'y	D3	3(449), Locking Tab, Spring	5

Fig. D2

IMPORTANT SAFETY NOTICE
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

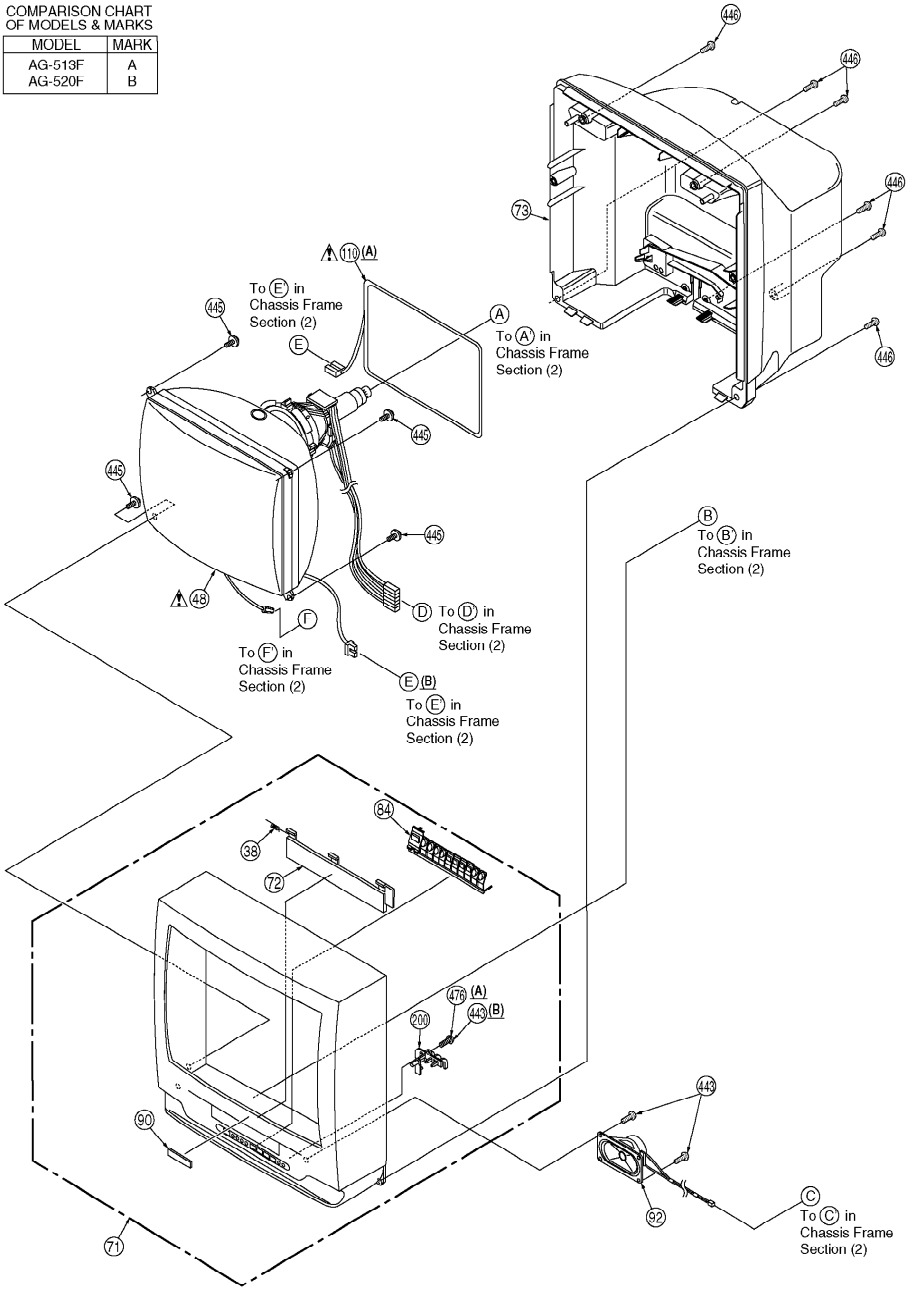
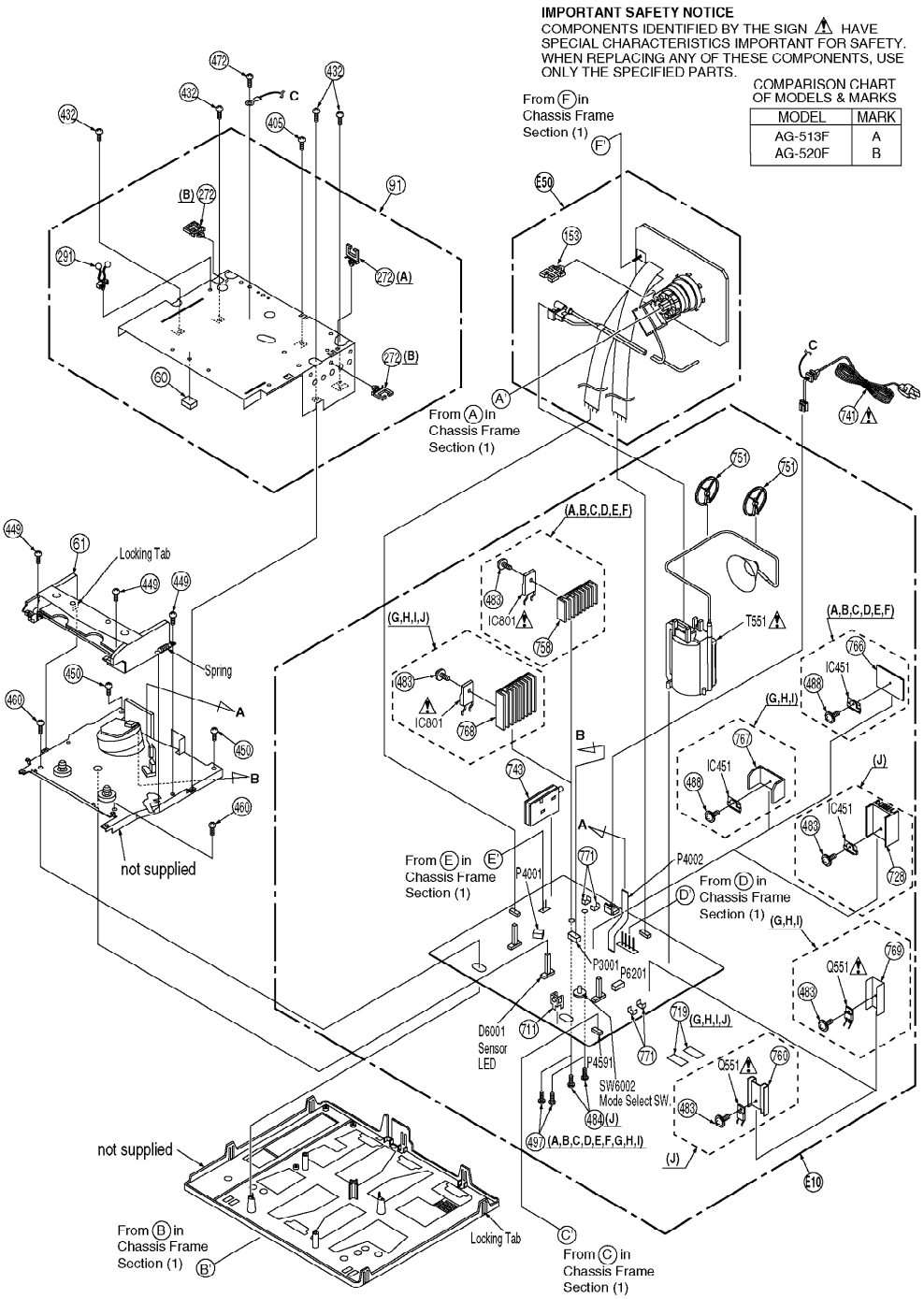


Fig. D3



6.1.2.1. Notes in chart

1. Removal of VCR Unit

Fig. D4

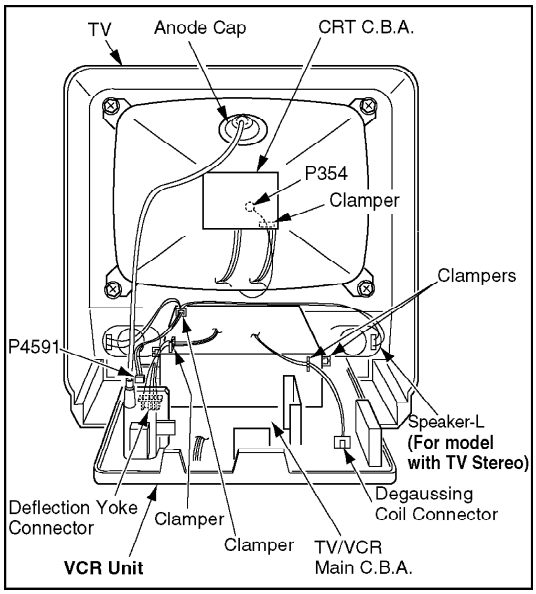
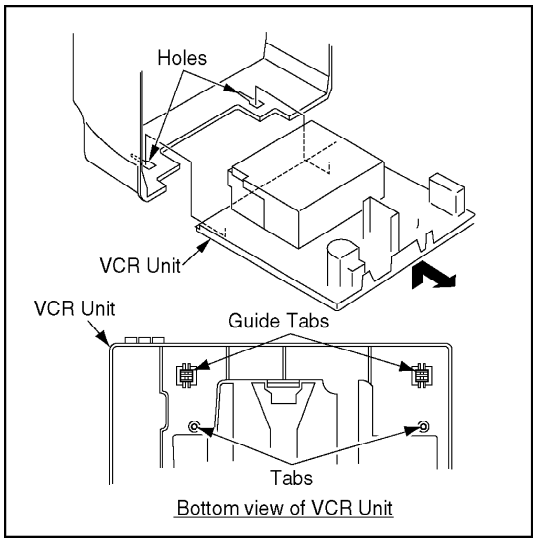


Fig. D5



Installation of VCR Unit

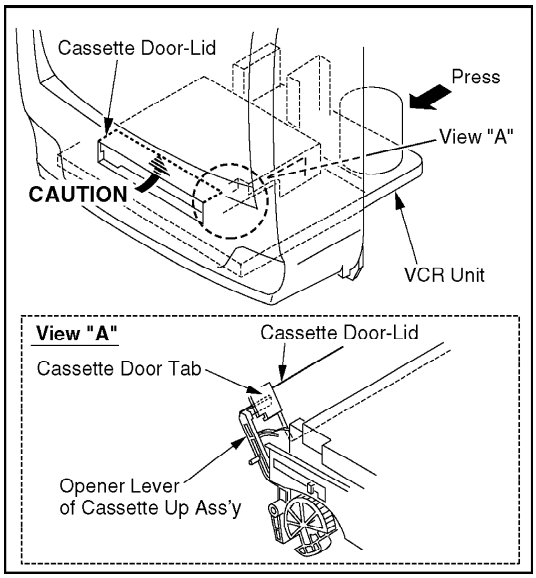
CAUTION:

Opener Lever may be damaged when VCR Unit is installed, with Cassette Door-Lid and Opener Lever of Cassette Up Ass'y set incorrectly.

A. When installing the VCR Unit, swing the Cassette Door-Lid all the way open until the Cassette Door tab clears the Opener Lever.

B. Make sure that all guide tabs are aligned properly. Then, press the VCR Unit straight in.

Fig. D6

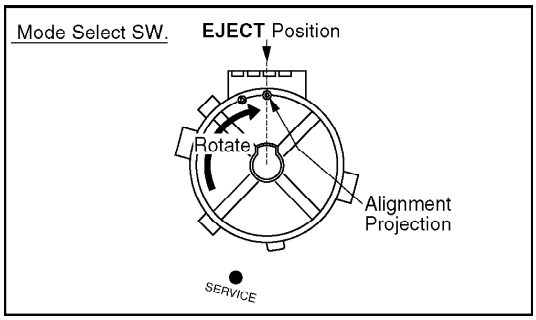


2. Removal of Color Picture Tube Unit
Place the Unit face down on a soft cloth before removing the Color Picture Tube Unit.

3. Installation of Mechanism Chassis Ass'y and TV/VCR Main C.B.A.
When installing 2 Screws (449), slide the Holder Unit of the Cassette Up Ass'y (Refer to "WHEN LOADING WITHOUT A CASSETTE" in SERVICE NOTES) to tighten screws. Then, slide it back to the EJECT Position.

4. Removal of TV/VCR Main C.B.A.
When disconnecting the P4002 Flat Cable from the Connector P4092 on the AC Head, care must be taken to hold the Connector P4092 stable to avoid damaging it.
Otherwise, a satisfactory picture and secure precise tracking will not be achieved. (Refer to "TAPE INTERCHANGEABILITY ADJUSTMENT" in MECHANICAL ADJUSTMENT.)
Installation of TV/VCR Main C.B.A.
A. Make sure the Mode Select SW. on the TV/VCR Main C.B.A. is in EJECT position. If not, rotate the Mode Select SW. until the alignment projection is in the EJECT Position.

Fig. D7



B. Install the Mechanism Chassis and Cassette Up Ass'y straight onto the TV/VCR Main C.B.A. so that the Sensor LED clears the hole in the Mechanism Chassis and that 3 Connectors (P6201, P3001 and P4001) are aligned and seated securely.

5. Installation of Cassette Up Ass'y

A. Confirm that the Locking Tab under the Cassette Up Ass'y is in Hole on the Mechanism Chassis when installing the Cassette Up Ass'y. Then, slide the Cassette Up Ass'y towards the back.

B. When installing 2 Screws (449), slide the Holder Unit (Refer to "WHEN LOADING WITHOUT A CASSETTE" in Service Notes) to tighten screws. Then, slide it back to the EJECT Position.

C. Hook Spring to the Drive Rack Arm on the Mechanism Chassis.

6.2. MECHANISM SECTION

6.2.1. Disassembly/Reassembly Method

This procedure starts with the condition that the cabinet parts and TV/VCR Main C.B.A. have been removed.
When reassembling, perform the step(s) in the reverse order.
Perform all disassembly/reassembly and alignments procedures in EJECT Position.

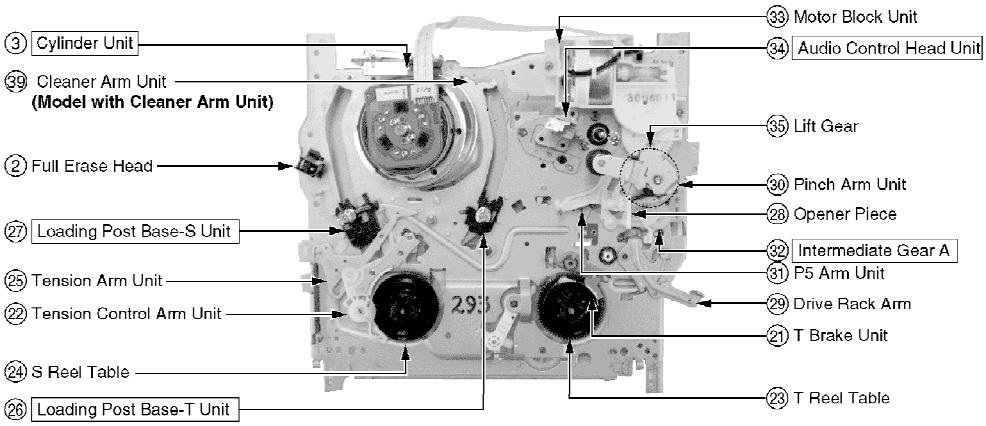
Step/Loc. No.	Prior Step(s)	Part	Fig. No.	Remove	Alignment/Adjustment
①	----------	Not used	-	-	
②	----------	Full Erase Head	J2	(L-1), (S-1), A/C Shield Plate	
③	1	Cylinder Unit	J2	2(S-2), 3(S-3), Flexible Cable, Head Amp C.B.A., Unsolder	TAPE INTERCHANGEABILITY Adjustment
④	----------	Capstan Belt	J3-1	-	
⑤	----------	Support Angle	J3-1	(S-4), (S-5)	
⑥	5	Intermediate Gear B	J3-1	(L-2)	Gear Alignment
⑦	4,5,6	Main Cam Gear	J3-1	Main Cam Push Nut	Gear Alignment
⑧	4	Center Clutch Unit	J4-1	(W-1)	
⑨	4,8	Changing Gear Spring	J4-1	-	
⑩	4,8,9	Changing Gear	J4-1	-	
⑪	4,8,9,10	Idler Arm Unit	J4-1	-	
⑫	----------	Reel Gear	J5-1	2(L-3)	
⑬	4,5,6,7,8,9,10	Main Rod	J5-1	(W-2), (L-4)	Gear Alignment
⑭	----------	Not used	-	-	
⑮	4	Capstan Motor Unit	J6	3(S-6)	
⑯	----------	Not used	-	-	
⑰	----------	Not used	-	-	
⑱	----------	Not used	-	-	
⑲	4,8,9,10,13	T Loading Arm Unit	J7-1	-	Gear Alignment
⑳	4,5,6,7,8,9,10,13,19	S Loading Arm Unit	J7-1	-	Gear Alignment
㉑	----------	T Brake Unit	J8-1	-	
㉒	----------	Tension Control Arm Unit	J8-1	3(L-5)	
㉓	21	T Reel Table	J8-1	-	
㉔	22	S Reel Table	J8-1	-	
㉕	22	Tension Arm Unit	J8-1	2(L-6), (P-1), (P-2)	
㉖	22,25	Loading Post Base-T Unit	J9	-	P2 AND P3 POST HEIGHT,
㉗	22,25	Loading Post Base-S Unit	J9	-	TAPE INTERCHANGEABILITY Adjustment
㉘	----------	Opener Piece	J10-1	2(L-7)	
㉙	4,5,6,7	Drive Rack Arm	J10-1	-	
㉚	28	Pinch Arm Unit	J10-1	Pinch Assist Spring	
㉛	28,30	P5 Arm Unit	J10-1	-	
㉜	5,6,28	Intermediate Gear A	J10-1	-	Gear Alignment
㉝	----------	Motor Block Unit	J11	2(S-9)	
㉞	----------	Audio Control Head Unit	J11	(S-10)	TAPE INTERCHANGEABILITY Adjustment
㉟	5,6,28,30,32,33	Lift Gear	J11	-	
㊱	----------	Not used	-	-	
㊲	22,25	Tension Arm Boss	J11	(L-8)	
㊳	----------	SS Brake Arm Unit	J5-1	(L-9), (P-3)	
㊴	----------	Cleaner Arm Unit **(Model with Cleaner Arm Unit)**	J11	(L-10)	

6.2.2. Inner Parts Location

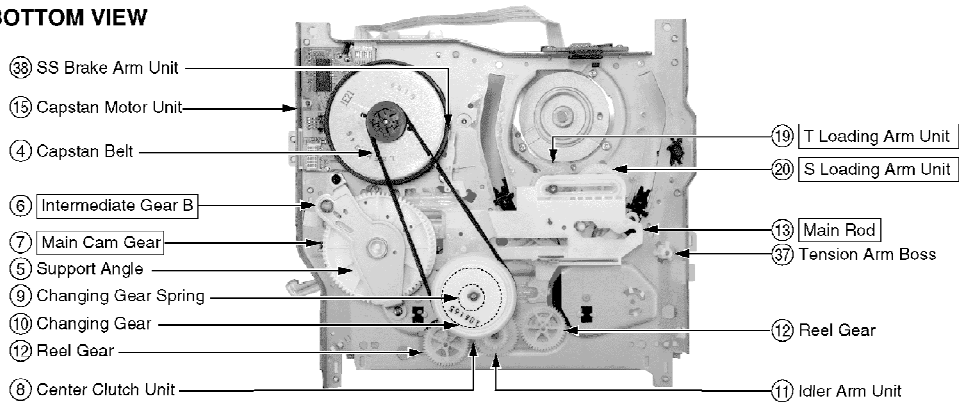
Note: BOX indicates alignment (Gear Alignment or Mechanical Adjustment) required when a part is replaced.

Fig. J1-1

TOP VIEW


③ Cylinder Unit
㊴ Cleaner Arm Unit
(Model with Cleaner Arm Unit)
② Full Erase Head
㉗ Loading Post Base-S Unit
㉕ Tension Arm Unit
㉒ Tension Control Arm Unit
㉔ S Reel Table
㉖ Loading Post Base-T Unit
㉝ Motor Block Unit
㉞ Audio Control Head Unit
㉟ Lift Gear
㉚ Pinch Arm Unit
㉘ Opener Piece
㉜ Intermediate Gear A
㉛ P5 Arm Unit
㉙ Drive Rack Arm
㉑ T Brake Unit
㉓ T Reel Table

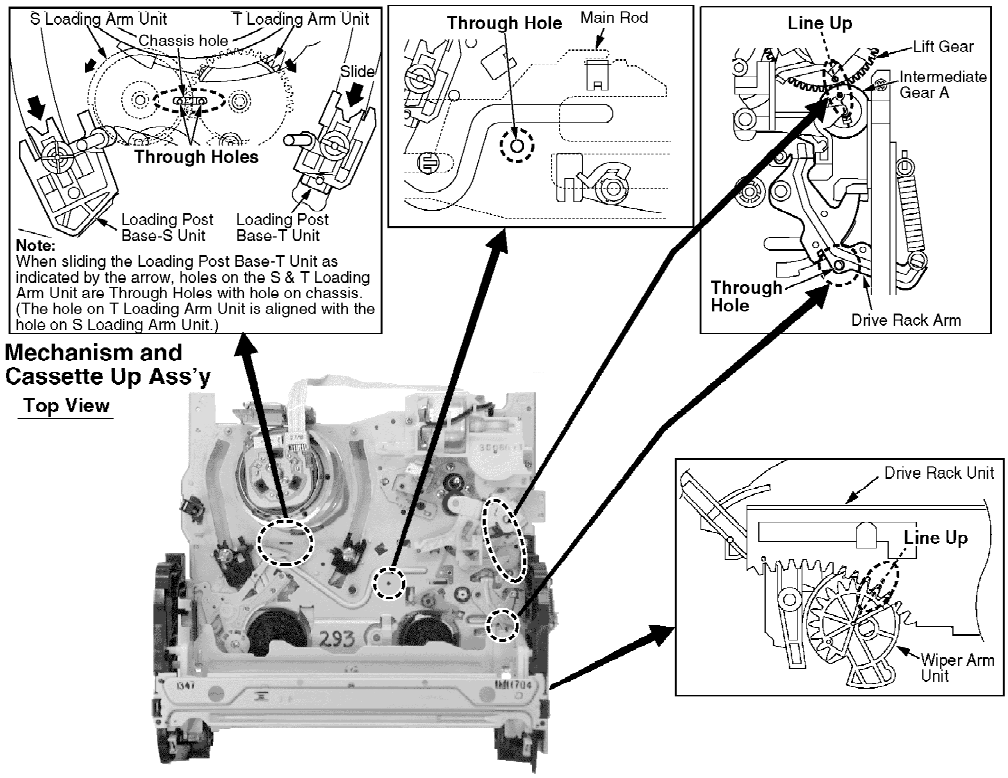
BOTTOM VIEW



6.2.3. EJECT Position Confirmation

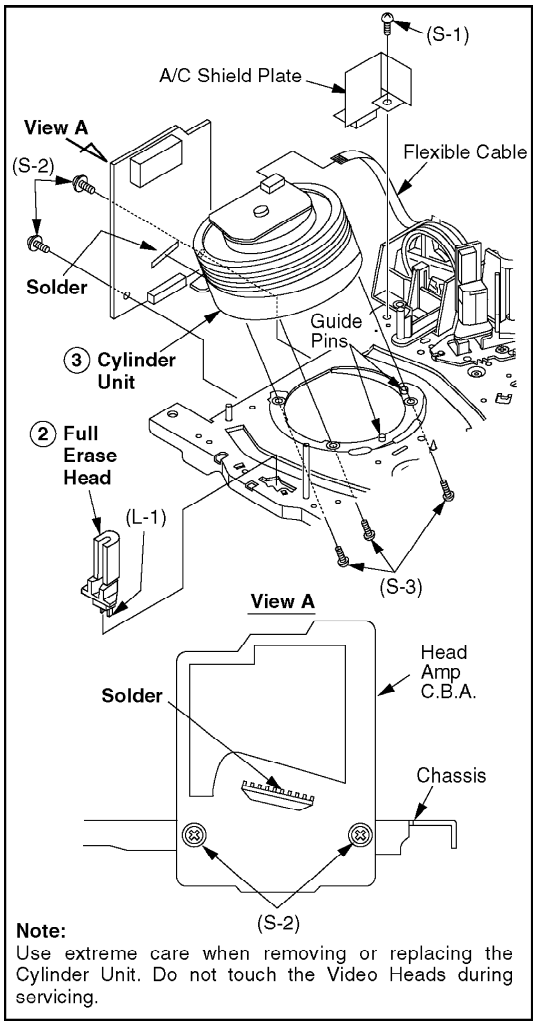
Fig. J1-2

Check the following alignment points to confirm that the Mechanism and Cassette Up Ass'y are in the **EJECT** Position from the top side.


S Loading Arm Unit
T Loading Arm Unit
Chassis hole
Slide
Through Holes
Loading Post Base-S Unit
Loading Post Base-T Unit
Note:
When sliding the Loading Post Base-T Unit as indicated by the arrow, holes on the S & T Loading Arm Unit are Through Holes with hole on chassis. (The hole on T Loading Arm Unit is aligned with the hole on S Loading Arm Unit.)
Through Hole
Main Rod
Line Up
Lift Gear
Intermediate Gear A
Through Hole
Drive Rack Arm
Mechanism and Cassette Up Ass'y
Top View
293
Drive Rack Unit
Line Up
Wiper Arm Unit

6.2.4. Full Erase Head and Cylinder Unit

Fig. J2

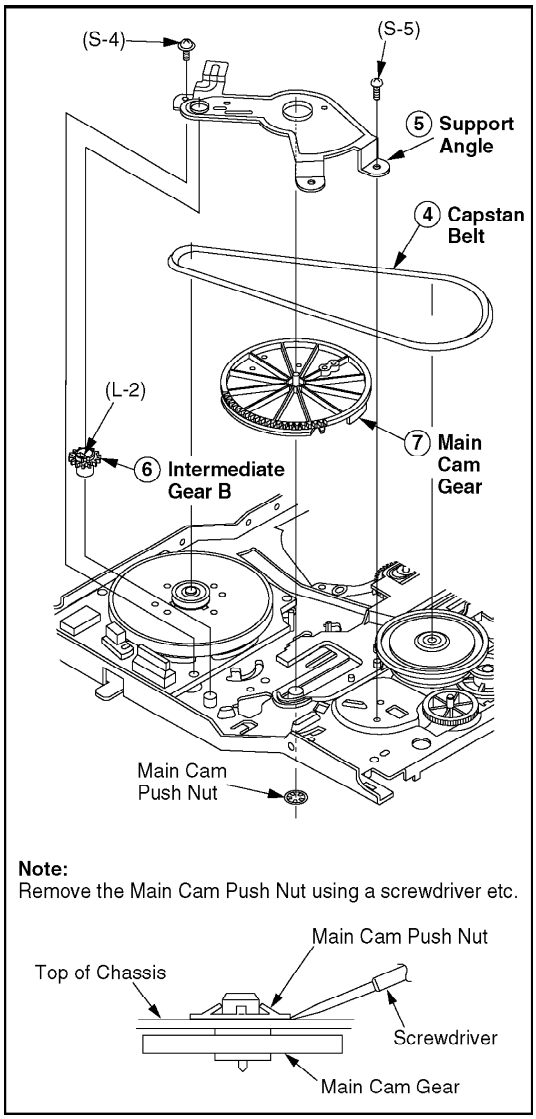


6.2.4.1. Reassembly Notes

1. After replacing the Cylinder Unit, clear the Total elapsed "Cylinder rotation" time (in hours) to 0. Refer to "USAGE SCREEN MODE" in SERVICE NOTES.

6.2.5. Capstan Belt, Support Angle, Intermediate Gear B, and Main Cam Gear

Fig. J3-1



6.2.5.1. Reassembly Notes

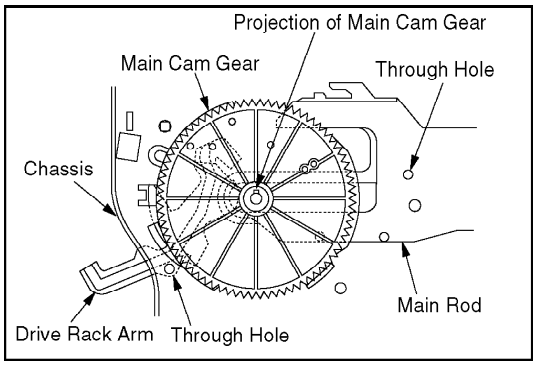
1. Alignment of Main Cam Gear, Drive Rack Arm, and Main Rod

A. Confirm that the hole on Main Rod is a Through Hole with a hole on chassis.

B. Confirm that the hole on Drive Rack Arm is a Through Hole with a hole on chassis.

C. Install the Main Cam Gear so that the projection of Main Cam Gear is in the upward position as shown.

Fig. J3-2

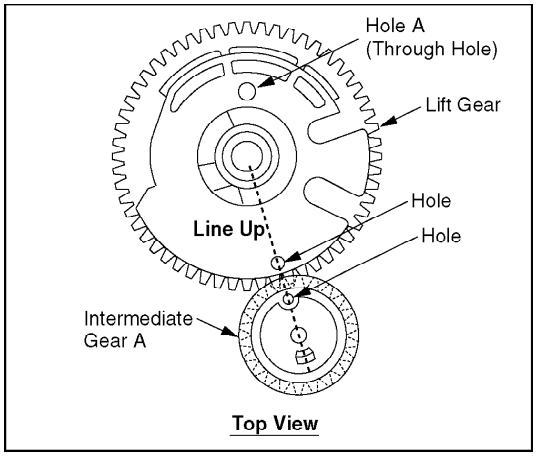


2. Confirmation/Alignment of Intermediate Gear B, Main Cam Gear, and Intermediate Gear A

A. Confirm that the Hole A on Lift Gear is a Through Hole with a hole on chassis.

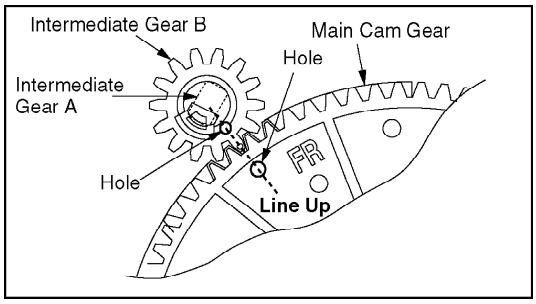
B. Confirm that the hole on Intermediate Gear A is aligned with the hole on Lift Gear.

Fig. J3-3



C. Install the Intermediate Gear B so that the hole on the Intermediate Gear B is aligned with the hole on the Main Cam Gear.

Fig. J3-4

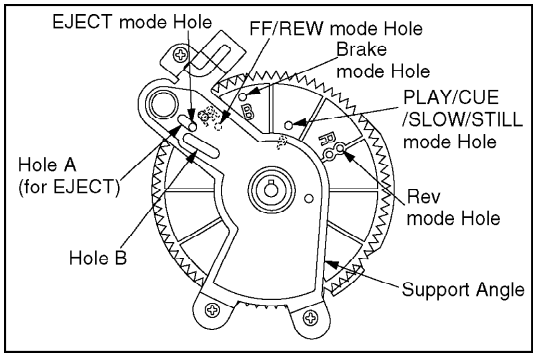


3. Holes on Main Cam Gear

A. The EJECT mode Hole on Main Cam Gear should be a Through

Hole with Hole A on Support Angle in EJECT mode. The each mode Hole on Main Cam Gear should be a Through Hole with Hole B on Support Angle in each mode.

Fig. J3-5



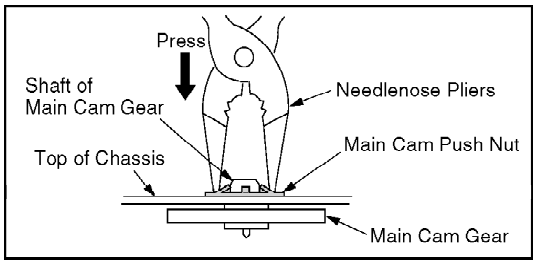
4. Drive Rack Arm Kit

A. Main Cam Gear is supplied as a Drive Rack ArmKit only. Main Cam Gear Kit consists of a Drive Rack Arm,a Main Cam Gear and a Main Cam Push Nut.
However, Main Cam Push Nut is available separately as a replacement part.

5. Installation of Main Cam Gear and Main Cam Push Nut

A. After installing the Support Angle, install the Main Cam Push Nut with Needlenose Pliers etc. so that it is flush with the chassis.
There may be some slight scratches on the Shaft of Main Cam Gear, when removing the Main Cam Gear. In case that the Main Cam Gear can be installed securely without tottering, it is fine to use the one. If any tottering, install all new parts.

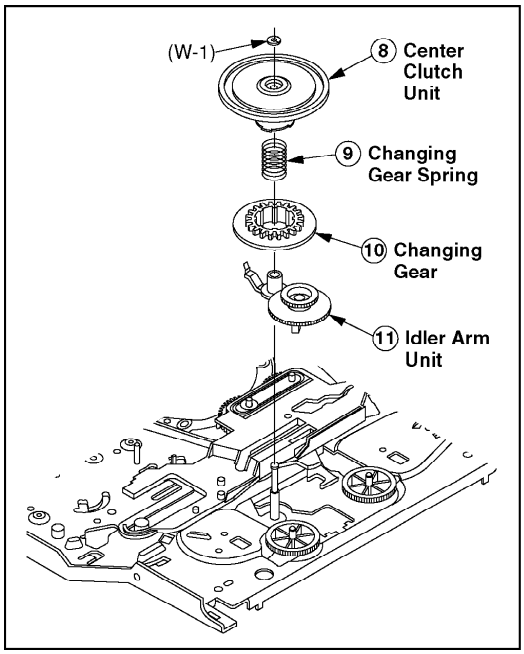
Fig. J3-6



6. The Main Cam Push Nut is not reusable. Install a new one.

6.2.6. Center Clutch Unit, Changing Gear Spring, Changing Gear, and Idler Arm Unit

Fig. J4-1

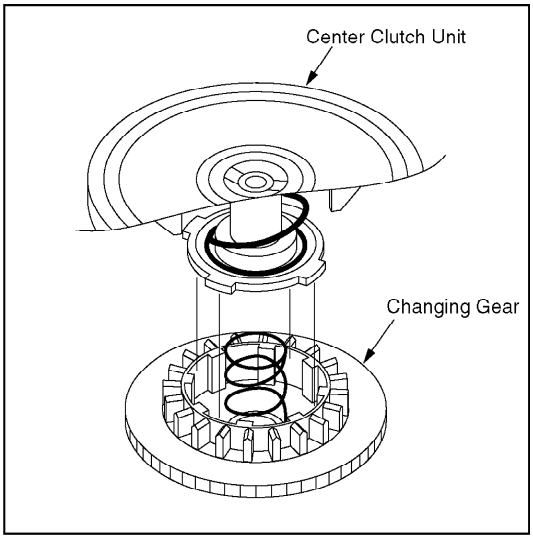


6.2.6.1. Reassembly Notes

1. Installation of Center Clutch Unit

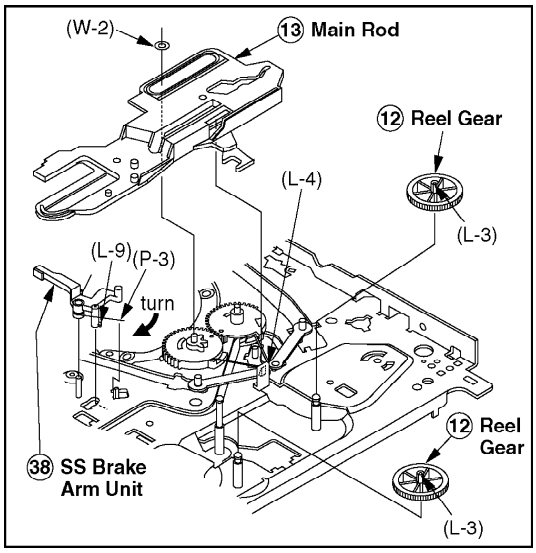
A. Fit the Center Clutch Unit into the Changing Gear.

Fig. J4-2



6.2.7. Reel Gear, Main Rod, and SS Brake Arm Unit

Fig. J5-1

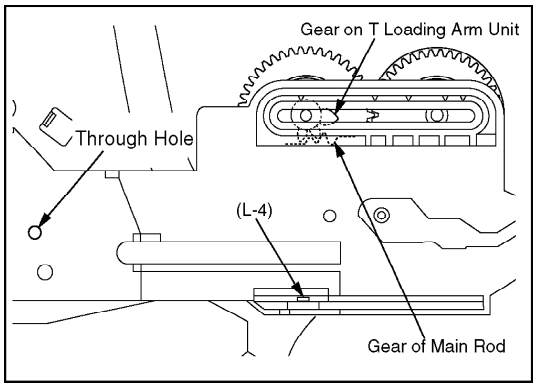


6.2.7.1. Reassembly Notes

1. Alignment of Main Rod and T Loading Arm Unit

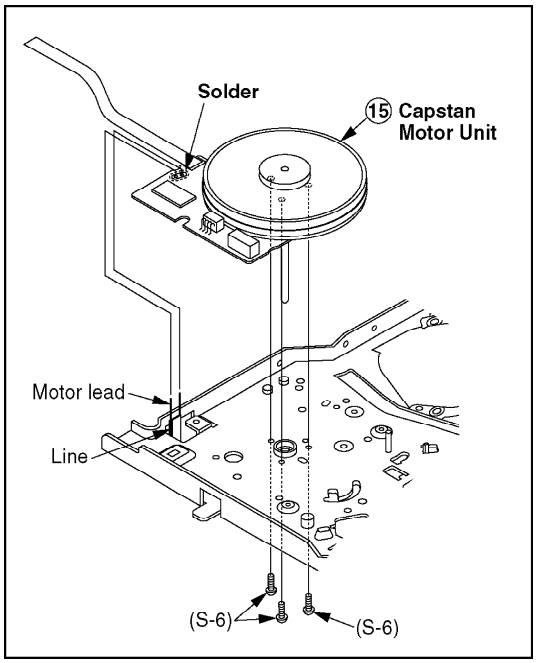
A. Align the Gear of T Loading Arm Unit with Gear of Main Rod. Confirm that the Hole on Main Rod is a Through Hole with a hole on chassis.

Fig. J5-2



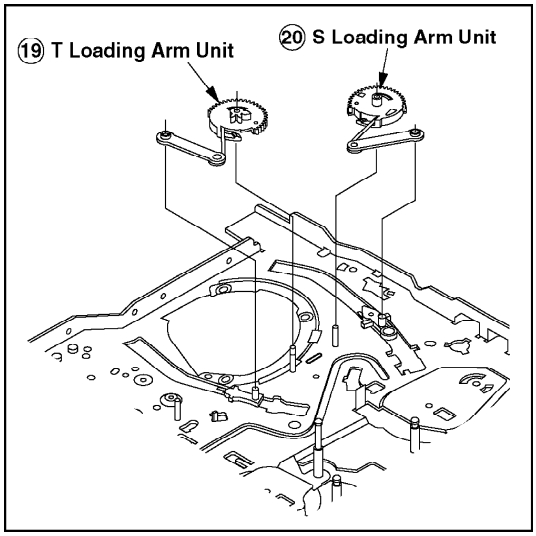
6.2.8. Capstan Motor Unit

Fig. J6



6.2.9. T Loading Arm Unit and S Loading Arm Unit

Fig. J7-1



6.2.9.1. Reassembly Notes

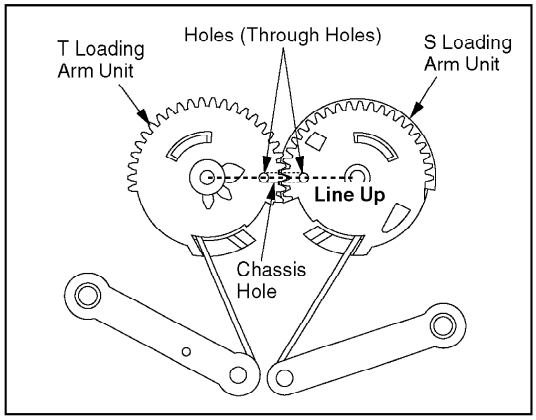
1. Alignment of T Loading Arm Unit and S Loading Arm Unit

A. Install the S Loading Arm Unit onto the chassis.

B. Install the T Loading Arm Unit so that the hole on T Loading Arm Unit is aligned with the hole on S Loading Arm Unit.

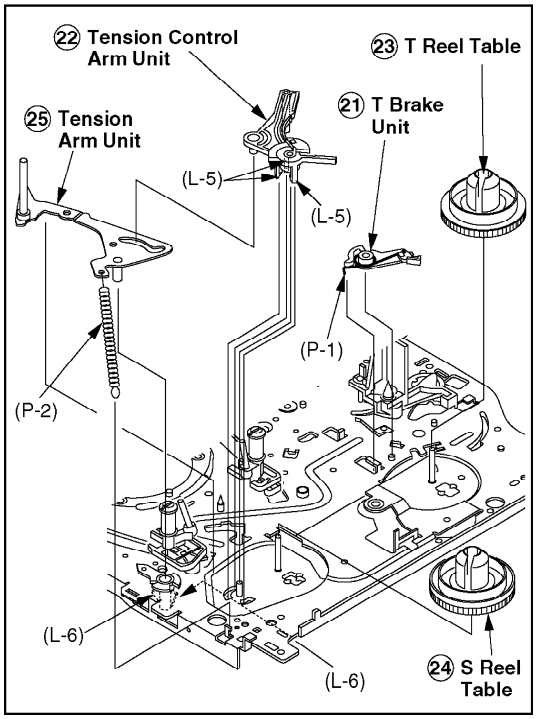
C. Confirm that the holes on the S & T Loading Arm Unit are Through Holes with hole on chassis.

Fig. J7-2



6.2.10. T Brake Unit, Tension Control Arm Unit, T Reel Table, S Reel Table, and Tension Arm Unit

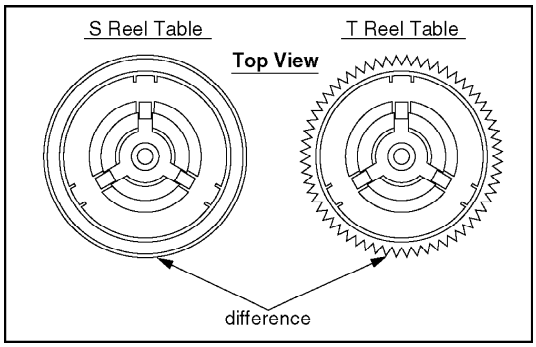
Fig. J8-1



6.2.10.1. Reassembly Notes

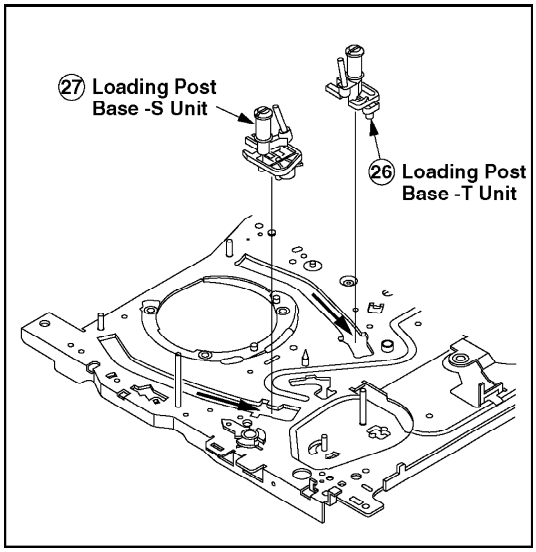
1. How to distinguish between S Reel Table and T Reel Table

Fig. J8-2



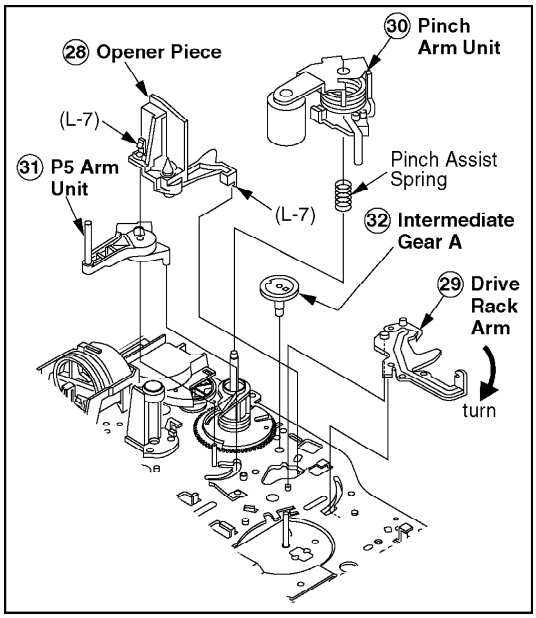
6.2.11. Loading Post Base -T Unit and Loading Post Base -S Unit

Fig. J9



6.2.12. Opener Piece, Drive Rack Arm, Pinch Arm Unit, P5 Arm Unit, and Intermediate Gear A

Fig. J10-1



6.2.12.1. Reassembly Notes

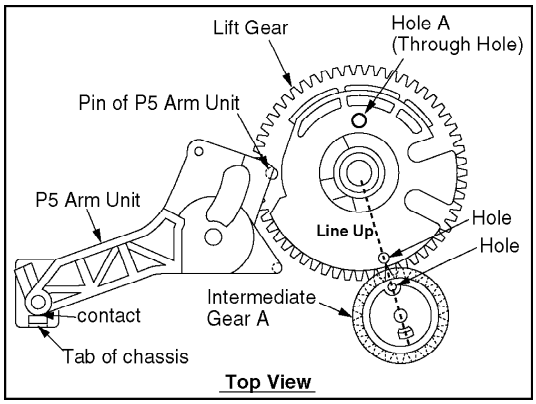
1. Installation/Alignment of Intermediate Gear A, Lift Gear and P5 Arm Unit

A. Rotate the Lift Gear so that Hole A on Lift Gear is a Through Hole with a hole on chassis.

B. Install the Intermediate Gear A so that the hole on Intermediate Gear A is aligned with the hole on Lift Gear.

C. Install the P5 Arm Unit so that it contacts with the tab of chassis.

Fig. J10-2



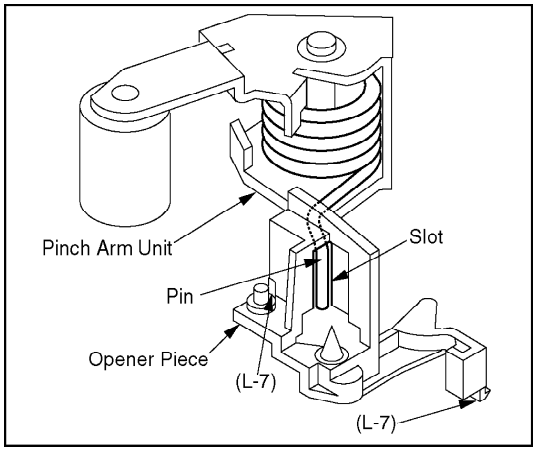
2. Drive Rack Arm Kit

A. Drive Rack Arm is supplied as a Drive Rack Arm Kit only.

3. Installation of Opener Piece

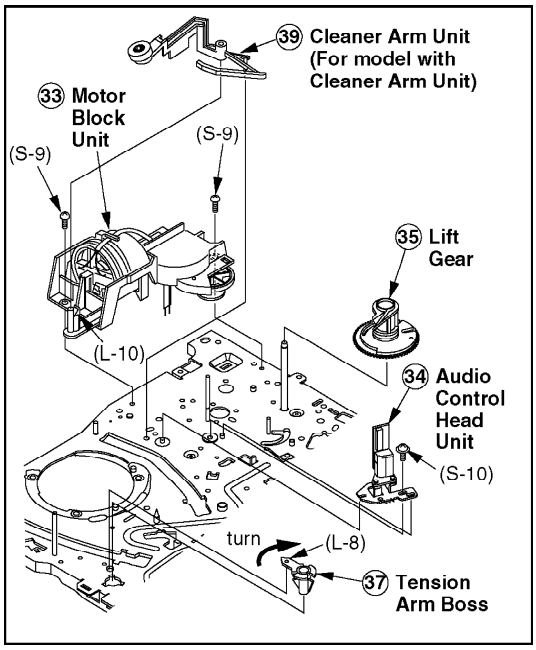
A. Install the Opener Piece so that the slot of the Opener Piece is inserted to the Pin of Pinch Arm Unit

Fig. J10-3



6.2.13. Motor Block Unit, Audio Control Head Unit, Lift Gear, Tension Arm Boss, and Cleaner Arm Unit

Fig. J11



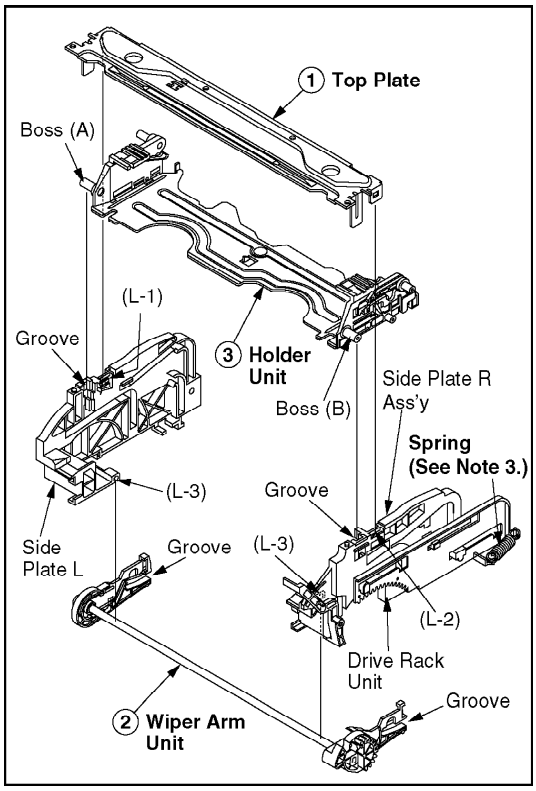
6.3. CASSETTE UP ASSEMBLY SECTION

This chart indicates Step/Location No. of Parts to be serviced and prior steps to gain access items to be serviced when disassembling. When reassembling, perform the step(s) in the reverse order.

Step/Loc. No.	Prior Step(s)	Part	Fig. No.	Remove	Alignment/Adjustment
①	----------	Top Plate	K1-1	(L-1), (L-2)	
②	1	Wiper Arm Unit	K1-1	2(L-3)	Gear Alignment
③	1,2	Holder Unit	K1-1	-	
④	----------	Opener Lever	K2	2(L-4)	
⑤	1,2,3,4	Drive Rack Unit	K2	-	

6.3.1. Top Plate, Wiper Arm Unit, and Holder Unit

Fig. K1-1



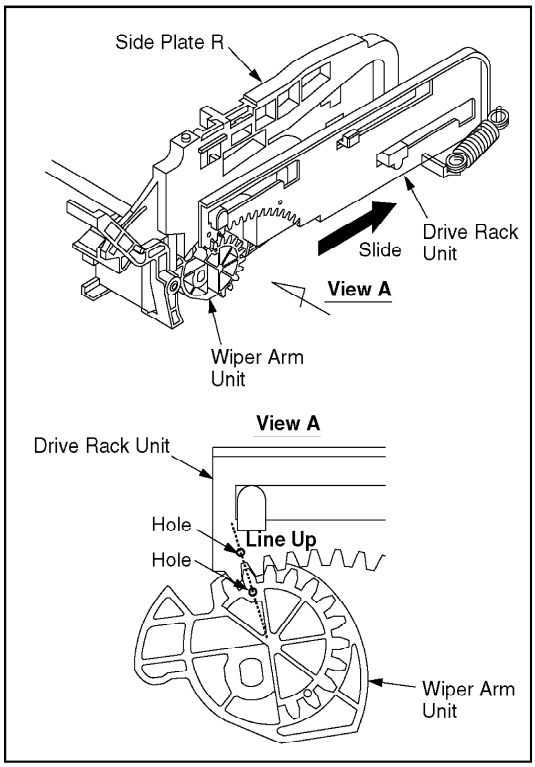
6.3.1.1. Reassembly Notes

1. Alignment of Wiper Arm Unit and Drive Rack Unit

A. Slide the Drive Rack Unit to the far right as indicated by the arrow.

B. Install the Wiper Arm Unit so that the hole on the Wiper Arm Unit is aligned with the hole on the Drive Rack Unit.

Fig. K1-2



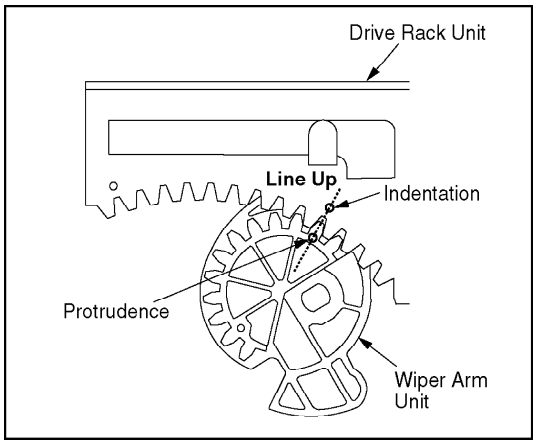
2. Installation of Holder Unit

A. Turn the Wiper Arm Unit so that the grooves on each end are aligned with the each groove on Side Plate L and R.

B. Insert Holder Unit boss (A) and (B) into the grooves as shown in Fig. K1-1.

C. Finally, in the EJECT Position, confirm that the protrudence on the Wiper Arm Unit is aligned with the indentation on the Drive Rack Unit.

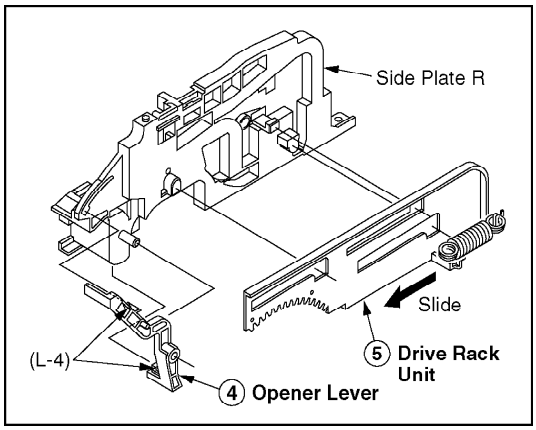
Fig. K1-3



3. Make sure to hook the spring to the Drive Rack Arm of Mechanism chassis.

6.3.2. Opener Lever and Drive Rack Unit

Fig. K2



7. ADJUSTMENT PROCEDURES

7.1. SERVICE FIXTURES AND TOOLS

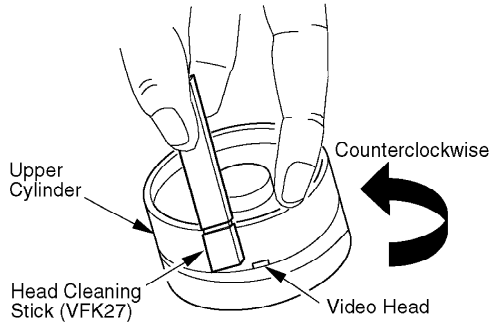
VFMS0003H6 VHS Alignment Tape Video: Color Bar & Monoscope Audio: 6kHz(MONO)	Back Tension Meter (Made in USA., Purchase Locally)	VFK27 Head Cleaning Stick
VFK0330 H-Position Adjustment Driver	VFKS0081 Grease	VFK0329 Post Adjustment Driver

7.2. MECHANICAL ADJUSTMENT

7.2.1. CLEANING PROCEDURE FOR THE UPPER CYLINDER UNIT

1. While slowly turning the Upper Cylinder Unit counterclockwise by hand, gently rub the Video Heads with a Head Cleaning Stick (VFK27) moistened with Ethanol.
When using a Cleaning Cassette, make sure to use "DRY" type only and be aware that excessive use can shorten head life.

Fig. M1



Note:

1. **Do not rub vertically or apply excess pressure to the Video Heads. Do not turn the Upper Cylinder Unit clockwise while cleaning.**
2. **After cleaning, use a Dry Head Cleaning Stick (VFK27) to remove any Ethanol remaining on the cylinder tape path. Otherwise, tape damage will occur.**

7.2.2. ADJUSTMENT PROCEDURES

7.2.2.1. BACK TENSION CONFIRMATION

Purpose:

To fine adjust the Back Tension so that the tape runs smoothly with a constant tension.

Symptom of Misadjustment:

1) If the tape tension is less than the specified value, the tape cannot come into proper contact with the Video Heads, resulting in poor picture playback.

2) If the tape tension is too high, the tape will soon be damaged.

Equipment Required:

Back Tension Meter (Made in U.S.A., Purchase Locally)

VHS Cassette Tape (120-Minute Tape)

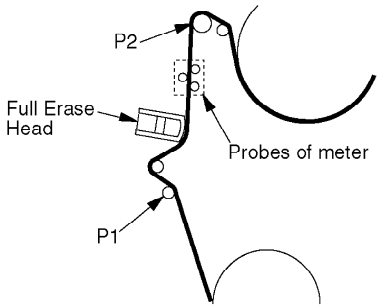
Specification:

22.4 gf±2.5 gf

(0.220 N±0.025 N)

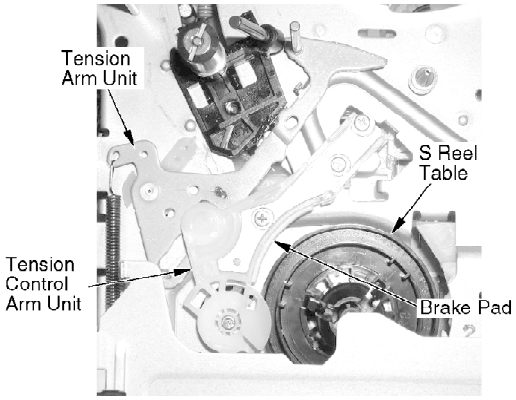
1. **Play back a T120 cassette tape from the beginning for approx. 10 to 20 seconds to stabilize tape movement.**
2. **Insert a Tension Meter into tape path and measure the back tension.**

Fig. M2-1



3. If the reading is out of specification, make sure that there is no dust or foreign material between the Brake Pad of Tension Control Arm Unit and the S Reel Table.
   After cleaning, the reading of tension measurement is still out of specification, replace the Tension Arm Unit and the Tension Control Arm Unit.

Fig. M2-2



Note:

1. Be sure that the three probes of the meter are all in solid contact with the tape, but not touching any other parts of the mechanism.
2. It is recommended that measurements should be repeated at least three (3) times because the tension meter is very sensitive to external vibrations.

7.2.2.2. TAPE INTERCHANGEABILITY ADJUSTMENT

Note:

To perform these adjustment/confirmation procedures, set the tracking to the neutral position.

Equipment Required:

Dual Trace Oscilloscope

VHS Alignment Tape (VFMS0003H6)
Post Adjustment Driver (VFK0329)
H-Position Adjustment Driver (VFK0330)

7.2.2.2.1. ENVELOPE OUTPUT ADJUSTMENT

The height of the P2 and P3 Posts replacement part is preadjust at the factory.

Purpose:

To achieve a satisfactory picture and secure precise tracking.

Symptom of Misadjustment:

If the envelope is output poorly, much noise will appear in the picture. Then the tracking will lose precision and the playback picture will be distorted by any slight variation of the tracking control circuit.

Equipment Required:

Post Adjustment Driver (VFK0329)

1. **Place a jumper between TP6003 and +5 V(TP6009) on the TV/VCR Main C.B.A. to defeat Auto Tracking.**
2. **Eject the tape and insert it again to access the Neutral Tracking position.**
3. **Play back the alignment tape.**
4. **Connect the oscilloscope to TP3002 on the Video Signal Process Section of the TV/VCR Main C.B.A. Use TP6205 as a trigger.**
5. **Confirm that the RF envelope is flat enough (V1/V-max. is 0.7 or more). If not, with Post Adjustment Driver, adjust P2 and P3 post height so that the envelope waveform becomes as flat (V1/V-max. is 0.7 or more) as possible (No envelope drop). If the envelope drop appears on the left-half of the waveform, adjust P2 post height. If the envelope drop appears on the right-half of the waveform, adjust P3 post height.**

CAUTION:

Overtightening P2 and P3 posts may cause the threads to strip.

Note:

It will be possible to confirm Step 5 according to following steps.

1. **Press the Tracking Control Up or Down button on remote control. Make sure that the envelope waveform remains flat. If not, readjust P2 and/or P3 post heights.**

Fig. M3-1

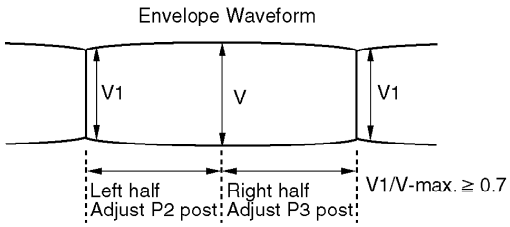
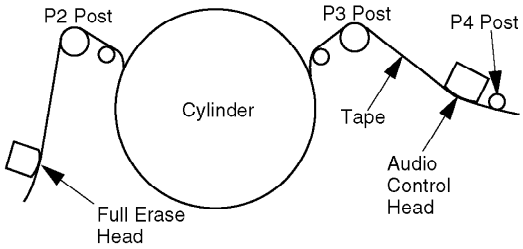
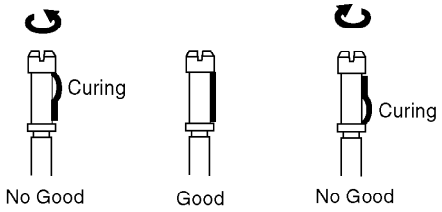


Fig. M3-2



6. After adjustment, confirm that the tape travels without curling at P2 and P3 posts.

Fig. M3-3



7. Remove the jumper after completing the adjustment procedure.

7.2.2.2.2. AUDIO CONTROL HEAD TILT ADJUSTMENT

Purpose:

To confirm that the tape runs smoothly. In particular, confirm that the tape properly picks up the Audio Signal at the upper part of the head and the Control Signal at the lower part of the head.

Symptom of Misadjustment:

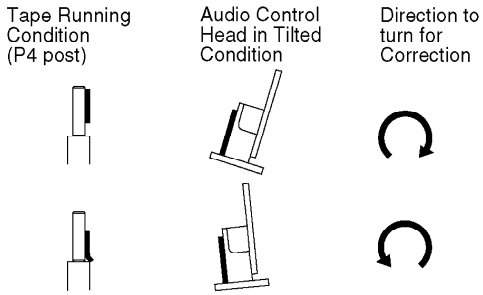
If the tilt of the Audio Control Head is poorly adjusted, the tape will eventually be damaged. An intermittent Blue screen may be seen in Playback.

1. Play back a T120 cassette tape and check that the tape travels smoothly between the upper and lower guides of the P4 post.

2. If necessary, adjust Black Screw (B) clockwise until the tape begins to curl at the lower edge of the P4 post. Then adjust the

screw counterclockwise until the curling is eliminated.

Fig. M4



7.2.2.2.3. AUDIO CONTROL HEAD HEIGHT ADJUSTMENT

The height of the Audio Control Head replacement part is preset at the factory.

Purpose:

To be sure the tape runs properly along the Control Head.

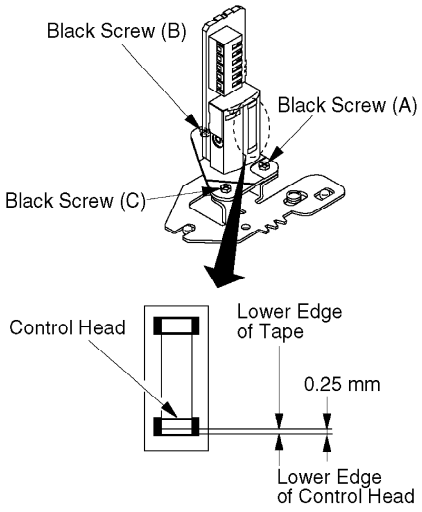
Symptom of Misadjustment:

If the control signal is not properly picked up, Servo Operation cannot be achieved. A Blue screen will be seen in Playback.

This confirmation is required when the Audio Control Head is replaced.

1. **Play back a T120 cassette tape and check that the lower edge of the tape runs approximately 0.25 mm above the lower edge of the Audio Control Head.**
2. **If necessary, adjust Black Screws (A) and (B) clockwise to lower the tape or counterclockwise to raise.**

Fig. M5



7.2.2.2.4. AUDIO CONTROL HEAD AZIMUTH ADJUSTMENT

Purpose:

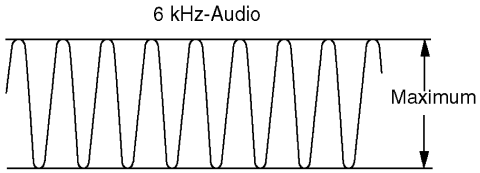
To adjust the position and height of the Audio Control Head so that it meets the tape tracks properly.

Symptom of Misadjustment:

If the position of the Audio Control Head is not properly adjusted, the Audio S/N Ratio is poor.

1. **Connect the oscilloscope to the TP4002 on the TV/VCR Main C.B.A.**
2. **Play back the 6 kHz Monaural Audio portion of the alignment tape.**
3. **Adjust Black Screw (C) on the Audio Control Head base so that the output level is at maximum.**

Fig. M6



4. **Confirm the height of the Audio Control Head is proper. If not, readjust Black Screws (A) and (B).**

7.2.2.2.5. AUDIO CONTROL HEAD HORIZONTAL POSITION ADJUSTMENT

Purpose:

To adjust the Horizontal Position of the Audio Control Head.

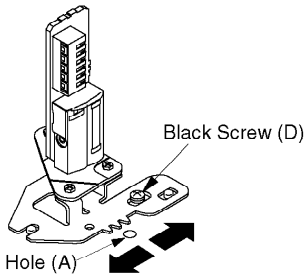
Symptom of Misadjustment:

If the Horizontal Position of the Audio Control Head is not properly adjusted, a maximum envelope cannot be obtained at the Neutral Position of the Tracking Control Circuit.

1. **Place a jumper between TP6003 and +5 V(TP6009) on the TV/VCR Main C.B.A. to defeat Auto Tracking.**
2. **Eject the tape and insert it again to access the Neutral Tracking position.**
3. **Play back the alignment tape.**
4. **Connect the oscilloscope to TP3002 on the Video Signal Process Section of the TV/VCR Main C.B.A. Use TP6205 as a trigger.**
5. **Loosen the Black Screw (D) and tighten it slightly. Set the H-Position Adjustment Driver into the Hole (A). Then slowly turn the**

fixture either clockwise or counterclockwise so that the envelope is at maximum.

Fig. M7



6. Tighten Black Screw (D).

7. Remove the jumper between TP6003 and +5 V(TP6009).

Note:

Old type of H-Position Adjustment Driver (VFK0136) can be used for this adjustment.

7.3. ELECTRICAL ADJUSTMENT

7.3.1. TEST EQUIPMENT

To do all of these electrical adjustments, the following equipment is required.

1. Dual-Trace Oscilloscope
Voltage Range: 0.001 V to 50 V/Div.
Frequency Range: DC to 50 MHz
Probes: 10:1, 1:1

2. NTSC Video Pattern Generator

3. DVM (Digital Volt Meter)

4. MTS/SAP Signal Generator
(TV Multi-Channel Sound Modulator (U.S.A.))

5. Frequency Counter
Frequency Range: 0 to 150 MHz

6. Plastic Tip Driver and Non-Metal Driver

7. Isolation Transformer (Variable)

8. VHS Alignment Tape (VFMS0003H6)

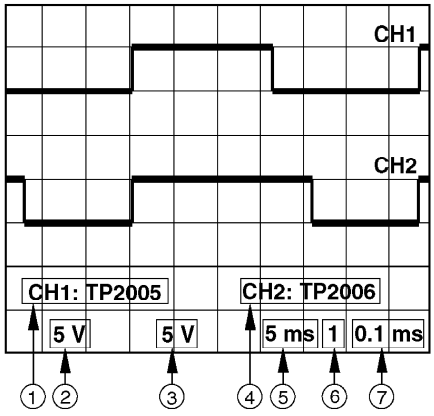
9. Degaussing Coil

10. White Pattern Generator

11. Audio Generator

7.3.2. HOW TO READ THE ADJUSTMENT PROCEDURES

Fig.E1



1. Connecting Point
3. Volts/DIV
5. Time/DIV
7. Time/DIV for Delay

2. Volts/DIV
4. Connecting Point
6. Trigger Channel of the Scope
   1 : CH1
   2 : CH2

7.3.3. FM VCO ADJUSTMENT (FOR MODEL WITH FM RADIO AND TV STEREO)

Purpose:

To set VCO free run frequency.

Symptom of Misadjustment:

Even when stereophony is received, only monaural sound will be output.

Test Point :

C9203(-), TP9201 (TV/VCR Main C.B.A.)

Adjustment :

R9206 (TV/VCR Main C.B.A.)

Specification :

38.0 kHz±50 Hz

INPUT :

Mode :

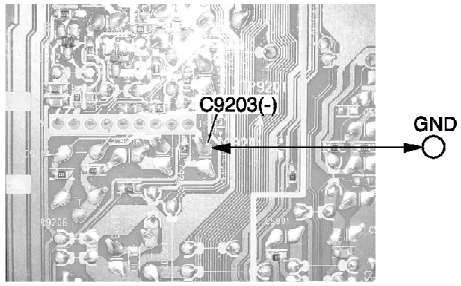
STEREO audio (FM Radio)

Equipment :

Frequency Counter

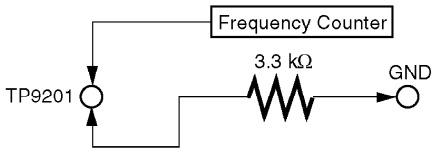
1. Connect C9203(-) on the TV/VCR Main C.B.A. to GND.

Fig. E3-1



2. Connect TP9201 on the TV/VCR Main C.B.A. to GND through a resistor (3.3 kW). Then, connect Frequency Counter to TP9201.

Fig. E3-2



3. Adjust R9206 (FM VCO) so that the frequency is 38.0 kHz± 50 Hz.

7.3.4. EVR (Electronic Variable Register) ADJUSTMENT WITH THE REMOTE CONTROL

This unit has electronic technology using I2C Bus concept. The following control functions are adjusted by using "On Screen Displays" and the remote control instead of adjusting mechanical controls (VR).

Memory IC Reference Table

Control functions	※1 Address	Range	Default
SUB COLOR	00	C0 - FF, 00 - 3F	**00**
SUB TINT	01	E0 - FF, 00 - 1F	**00**
SUB BRIGHT	02	C0 - FF, 00 - 3F	**DE**
CONTRAST	03	C1 - FF, 00	**00**
SUB SHARPNESS	04	E0 - FF, 00 - 1F	**F0**
R CUT -OFF	05	00 - 7F	**1E**
G CUT -OFF	06	00 - FD	**3C**
B CUT -OFF	07	00 - FD	**3C**
G DRIVE	08	00 - 7F	**40**
B DRIVE	09	00 - 7F	**40**
SUB CONTRAST	0A	00 - 0F	**06**
H-CENTER	0B	00 - 0F	**08**
V SIZE	0D	00 - 7F	**40**
V POSITION ※2	0E	00 - 1F	**03**
ANR	10	00 - FD	**89**
PIC	11	00 - FD	**86**
VV COLOR	12	00 - FF	**00**
VV TINT	13	00 - FF	**00**
VV SHARPNESS	14	00 - FF	**F8**
PG SHIFTER	15	01 - FD	**80**
FM ANT ※3	18	00 - 01	**00/01**

Note:

※1. Address is not displayed on the TV screen.
Other Addresses except above are not used.

※2. For Model with 20 inch CRT, V POSITION are not required in EVR adjustment.

7.3.4.1. EVR ADJUSTMENT ITEM

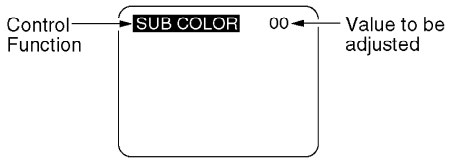
The following Items need to be adjusted for EVR adjustment.

- **PG SHIFTER ADJUSTMENT**
- **SUB CONTRAST ADJUSTMENT**
- **FOCUS, SCREEN, CUT OFF, DRIVE ADJUSTMENT**
- **SUB COLOR/SUB TINT ADJUSTMENT**
- **V. HEIGHT/H. POSITION ADJUSTMENT**
- **WHITE BALANCE ADJUSTMENT**
- **SUB BRIGHTNESS ADJUSTMENT**

7.3.4.2. How to enter EVR adjustment mode

Press and hold STOP, PLAY, and VOL- buttons on the unit together over 5 seconds with no cassette inserted.
The adjustment overlay will appear.

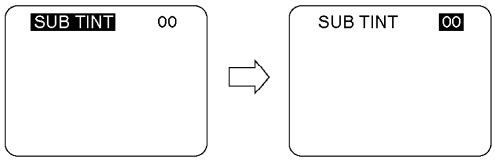
Fig. E4-1



7.3.4.2.1. How to adjust:

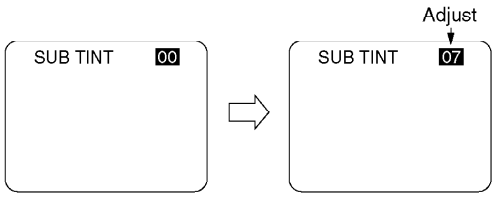
1. **Press CH UP/DOWN key on the remote control to select control function to be adjusted.**
   Important Note:
   Make a note of the original value of the controls before modifying in case the wrong control is adjusted.
2. **Press VOL -/+ key on the remote control so that the shaded area moves to the value.**

Fig. E4-2



3. **Press CH UP/DOWN key on the remote control to adjust the value of the selected control.**

Fig. E4-3

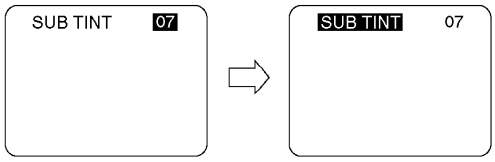


Note:

You can select a desired channel by using the numbered keys on the remote control in EVR adjustment mode.

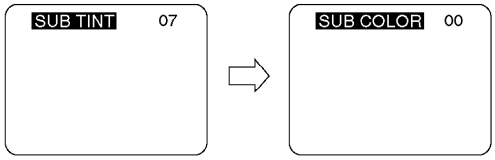
4. Press VOL -/+ key on the remote control so that the shaded area moves to the control function.

Fig. E4-4



5. Press CH UP/DOWN key on the remote control to select a control function for the next adjustment if necessary.

Fig. E4-5



7.3.4.2.2. How to release from EVR Adjustment Mode:

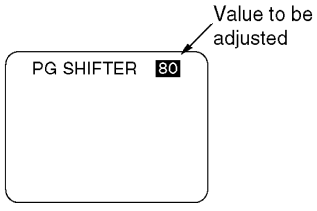
Press and hold STOP, PLAY, and VOL- buttons on the unit together over 5 seconds again or press the POWER button OFF to release EVR adjustment mode. The adjusted value will be written to Memory IC (IC6004).

7.3.4.3. HOW TO ENTER EVR PG SHIFTER ADJUSTMENT MODE

1. Enter EVR adjustment mode.

2. Insert the VHS Alignment Tape and playback in SP mode. The adjustment overlay will appear.

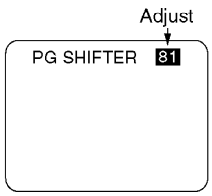
Fig. E4-6



7.3.4.3.1. How to adjust:

Press CH UP/DOWN key on the remote control to adjust the value.

Fig. E4-7



7.3.4.3.2. How to release from EVR PG Shifter Adjustment Mode:

Press STOP button or press the POWER button OFF.
The adjusted value will be written to Memory IC (IC6004).

7.3.4.4. HOW TO ENTER SERVICE MODE

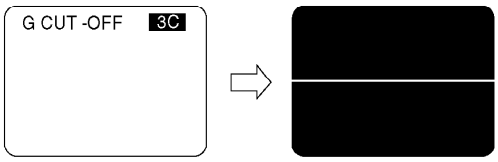
1. Enter EVR adjustment mode.

2. Press DISPLAY key on the remote control for collapse scan.

Note:

Before pressing DISPLAY key on the remote control for collapse scan, select the desired control function and move the shaded area to the value for adjustments you will proceed.

Fig. E4-8



7.3.4.4.1. How to release from Service Mode:
Press DISPLAY key again on the remote control.

7.3.5. PG SHIFTER ADJUSTMENT

Purpose:

Determine the Video Head Switching Point during Playback.

Symptom of Misadjustment:

May cause Head Switching Noise and/or Vertical Jitter.

Test Point :

TP3001 (TV/VCR Main C.B.A.),
TP6205 (TV/VCR Main C.B.A.)

Adjustment :

PG SHIFTER (EVR)

Specification :

T = 6 H±1 H (0.38 ms±0.06 ms)

INPUT :

Mode :

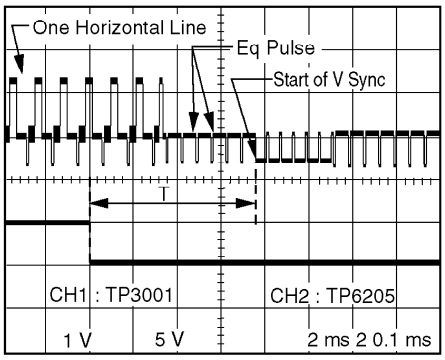
SP Playback

Equipment :

Oscilloscope,
VHS Alignment Tape (VFMS0003H6)

1. Enter EVR PG Shifter Adjustment mode, refer to "HOW TO ENTER EVR PG SHIFTER ADJUSTMENT MODE."
2. Connect the channel-1 scope probe to TP3001 and the channel-2 scope probe to TP6205. Used TP6205 as a trigger.
3. Adjust value so that the trailing edge of the head switching pulse is placed 6 H±1 H (0.38 ms±0.06 ms) before the start of the vertical sync pulse.
4. Release EVR PG Shifter Adjustment Mode.
   The adjusted value will be written to Memory IC (IC6004).

Fig. E5



7.3.6. SUB CONTRAST ADJUSTMENT

Purpose:

To set the optimum sub contrast level.

Symptom of Misadjustment:

The picture is too dark or too light.

Test Point :

Pin 5 of P6001 (TV/VCR Main C.B.A.) or TP49 (CRT C.B.A.)

Adjustment :

SUB CONTRAST (EVR)

Specification :

3.0 V[p-p]±0.1 V[p-p]

INPUT :

Video Input Jack,
Crosshatch Pattern Signal 1 V[p-p]
(75 Ω terminated)

Mode :

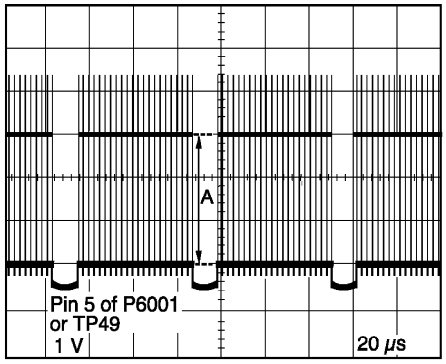
STOP

Equipment :

Oscilloscope,
NTSC Video Pattern Generator

1. **Supply a Crosshatch Pattern Signal to the Video Input Jack.**
2. **Connect the Oscilloscope to Pin 5 of P6001 on the TV/VCR Main C.B.A. or TP49 on the CRT C.B.A.**
3. **Select SUB BRIGHT in EVR adjustment mode. Then, after making a note of the original value, adjust to the (C0).**
4. **Select SUB CONTRAST in EVR adjustment mode and adjust so that the level A is 3.0 V[p-p]±0.1 V[p-p].**
5. **Select SUB BRIGHT in EVR adjustment mode and reset to the original value.**

Fig. E6



7.3.7. FOCUS, SCREEN, CUT OFF, DRIVE ADJUSTMENT

Purpose:

To set the optimum Focus and Screen.

Symptom of Misadjustment:

The picture is out of Focus and there will be an improper screen color mix.

Test Point :

TP50 (CRT C.B.A.)

Adjustment :

FOCUS CONTROL (Flyback Transformer),
SCREEN CONTROL (Flyback Transformer),

SUB BRIGHT (EVR),
B DRIVE (EVR),
G DRIVE (EVR),
B CUT -OFF (EVR),
G CUT -OFF (EVR),
R CUT -OFF (EVR)

Specification :

Refer to descriptions below.

INPUT :

Video Input Jack,
Monoscope Pattern Signal

Mode :

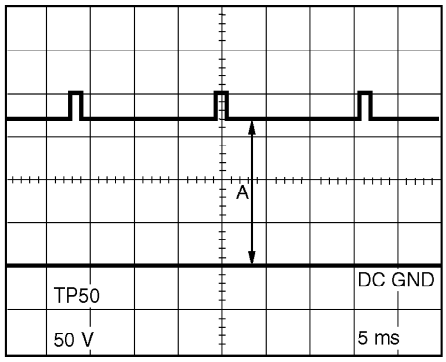
STOP

Equipment :

Oscilloscope,
NTSC Video Pattern Generator

1. **Supply a Monoscope Pattern Signal to the Video Input Jack.**
2. **Connect the Oscilloscope to TP50 on the CRT C.B.A. (Use TP47 for GND.)**
3. **Select SUB BRIGHT and move the shaded area to the value in EVR adjustment mode.**
4. **Adjust the FOCUS CONTROL on the Flyback Transformer so that the center of picture is the sharpest.**
5. **Turn the SCREEN CONTROL on the Flyback Transformer fully counterclockwise.**
6. **Press DISPLAY key on the remote control for collapse scan. (Refer to HOW TO ENTER SERVICE MODE.)**
7. **Adjust SUB BRIGHT in EVR adjustment mode so that the level A is (140 VDC±5 VDC: For model with 13 inch CRT) or (170 VDC±5 VDC: For model with 20 inch CRT).**

Fig. E7



8. Turn the SCREEN CONTROL on the Flyback Transformer clockwise carefully and stop at the point where any color is first observed.
9. In EVR adjustment mode, select the two colors not observed in step 8 from the following control functions (B CUT -OFF, G CUT -OFF, or R CUT -OFF) and adjust so that the horizontal line becomes white.
   For example, if the horizontal line appeared red in step 8, select and adjust the B CUT -OFF and G CUT -OFF.
   (See NOTE)
10. Press DISPLAY key on the remote control again to return for full frame scan.
11. Select SUB BRIGHT in EVR adjustment mode and adjust so that the picture has adequate brightness.
12. Select G DRIVE and B DRIVE in EVR adjustment mode and adjust so that the entire screen is white.

Note:

Before pressing DISPLAY key on the remote control for collapse scan, select the desired control function and move the shaded area to the value.

7.3.8. SUB COLOR/SUB TINT ADJUSTMENT

Purpose:

To set the standard color phase.

Symptom of Misadjustment:

Color phase will be shifted.

Test Point :

Pin 5 of P6001 (TV/VCR Main C.B.A.) or TP49 (CRT C.B.A.)

Adjustment :

SUB COLOR (EVR), SUB TINT (EVR)

Specification :

C = 1.40 V[p-p]±0.15 V[p-p]
(For model with 13 inch CRT)
C = 1.50 V[p-p]±0.15 V[p-p]
(For model with 20/25 inch CRT)

INPUT :

Video Input Jack,
Rainbow Color Bar

Mode :

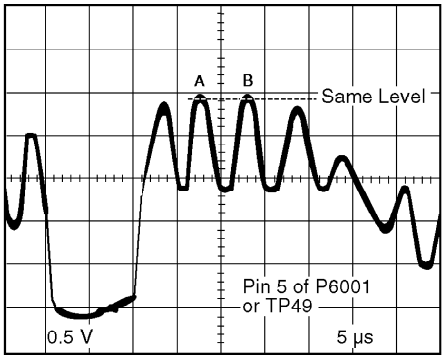
STOP

Equipment :

Oscilloscope,
NTSC Video Pattern Generator

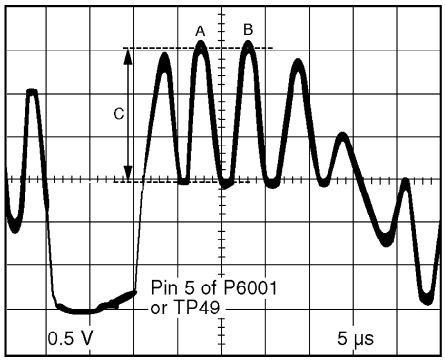
1. **Supply the Rainbow Color Bar signal to Video Input Jack.**
2. **Select SUB BRIGHT in EVR adjustment mode. Then, after making a note of the original value, adjust to the minimum (C0).**
3. **Connect the Oscilloscope to Pin 5 of P6001 on the TV/VCR Main C.B.A. or TP49 on the CRT C.B.A.**
4. **Select SUB TINT in EVR adjustment mode and adjust so that level A and B should be equal in amplitude.**

Fig. E8-1



5. **Select SUB COLOR in EVR adjustment mode and adjust so that the level C is (1.40 V[p-p]±0.15 V[p-p]: For model with 13 inch CRT) or (1.50 V[p-p]±0.15 V[p-p]: For model with 20 inch CRT).**

Fig. E8-2



6. Select SUB TINT in EVR adjustment mode and increase level B 1 click above the same level.
7. Select SUB BRIGHT in EVR adjustment mode and reset to the original value.

7.3.9. V. HEIGHT/H. POSITION ADJUSTMENT

Purpose:

To set the standard vertical and horizontal picture size.

Symptom of Misadjustment:

The picture size is on the vertical and horizontal axis is abnormal.

Test Point :

Adjustment :

V SIZE (EVR),
H-CENTER (EVR),
V POSITION (EVR)
(For model with 13/25 inch CRT)

Specification :

Refer to descriptions below.

INPUT :

Video Input Jack,
Monoscope Pattern Signal

Mode :

STOP

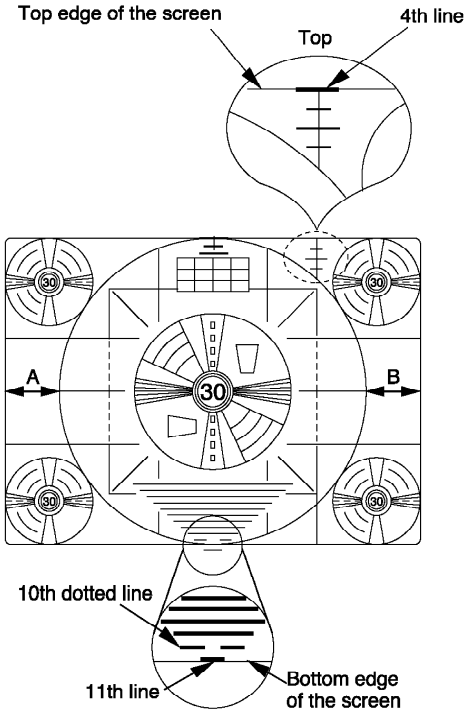
Equipment :

NTSC Video Pattern Generator

(For model with 13 inch CRT)

1. **Supply a Monoscope Pattern Signal to the Video Input Jack.**
2. **Select H-CENTER in EVR adjustment mode and adjust so that width A is approximately equal to width B.**
   Note:
   Width A is wider than width B slightly.
3. **Select V SIZE in EVR adjustment mode and adjust so that the 11rd line is just in view.**
4. **If the line are not positioned correctly, select V POSITION in adjustment mode and adjust correctly.**

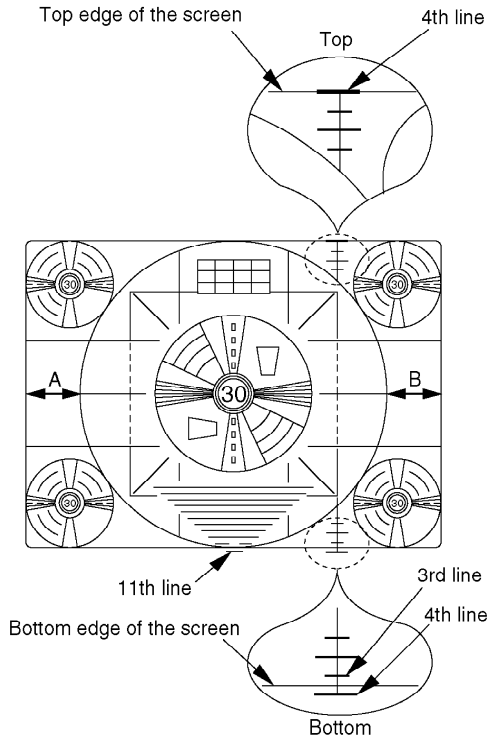
Fig. E9-1



(For model with 20 inch CRT)

1. **Supply a Monoscope Pattern Signal to the Video Input Jack.**
2. **Select H-CENTER in EVR adjustment mode and adjust so that A is approximately equal to width B.**
3. **Select V SIZE in EVR adjustment mode and adjust so that the top 4th line is just in view.**
4. **Confirm that the bottom 3rd line is in view and that the bottom 4th line is out of view.**

Fig. E9-2



7.3.10. WHITE BALANCE ADJUSTMENT

Purpose:

To set the standard white level for each color temperature.

Symptom of Misadjustment:

White becomes bluish or reddish.

Test Point :

TP50 (CRT C.B.A)

Adjustment :

FOCUS CONTROL (Flyback Transformer),
SCREEN CONTROL (Flyback Transformer),
SUB BRIGHT (EVR),
G DRIVE (EVR),
B DRIVE (EVR),
R CUT -OFF (EVR),
G CUT -OFF (EVR),
B CUT -OFF (EVR)

Specification :

Refer to descriptions below.

INPUT :

Video Input Jack,
Monoscope Pattern Signal,
White Pattern Signal

Mode :

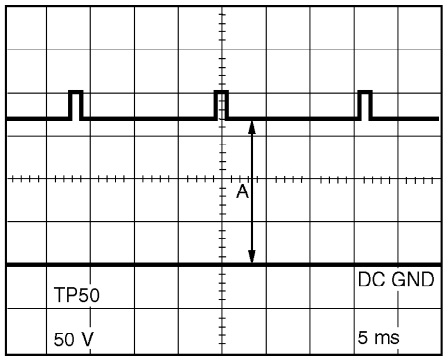
STOP

Equipment :

NTSC Video Pattern Generator,
White Pattern Generator,
Oscilloscope

1. **Supply a Monoscope Pattern Signal to the Video Input Jack.**
2. **Connect the Oscilloscope to TP50 on the CRT C.B.A. (Use TP47 for GND.)**
3. **Select SUB BRIGHT and move the shaded area to the value in EVR adjustment mode.**
4. **Adjust the FOCUS CONTROL on the Flyback Transformer so that the center of picture is the sharpest.**
5. **Turn the SCREEN CONTROL on Flyback Transformer fully counterclockwise.**
6. **Press DISPLAY key on the remote control for collapse scan. (Refer to HOW TO ENTER SERVICE MODE.)**
7. **Adjust SUB BRIGHT in EVR adjustment mode so that the level A is (140 VDC±5 VDC: For model with 13 inch CRT) or (170 VDC±5 VDC: For model with 20 inch CRT).**

Fig. E10



8. **Turn the SCREEN CONTROL on the Flyback Transformer**

clockwise carefully and stop at the point where any color is first observed.

9. In EVR adjustment mode, select the two colors not observed in step 8 from the following control functions (B CUT -OFF, G CUT -OFF, or R CUT -OFF) and adjust so that the horizontal line becomes white.
   For example, if the horizontal line appeared red in step 8, select and adjust the B CUT -OFF and G CUT -OFF.
   (See NOTE)
10. Supply a White Pattern Signal to the Video Input Jack.
11. Press DISPLAY key on the remote control again to return for full frame scan.
12. Select G DRIVE and B DRIVE in EVR adjustment mode and adjust so that the entire screen is white.
13. Select SUB BRIGHT in EVR adjustment mode. Then, after making a note of the original value, adjust to the minimum (C0) and while turning SUB BRIGHT value from minimum (C0) up to maximum (3F), confirm that the screen is tracking the White Pattern properly. Repeat the above steps 5, 9, 11, and 12 until the screen is properly tracking the White Pattern.

Note:

Before pressing DISPLAY key on the remote control for collapse scan, select the desired control function and move the shaded area to the value.

7.3.11. SUB BRIGHTNESS ADJUSTMENT

Purpose:

To set the optimum brightness level.

Symptom of Misadjustment:

The picture is too white or too black.

Test Point :

Adjustment :

SUB BRIGHT (EVR)

Specification :

Refer to descriptions below.

INPUT :

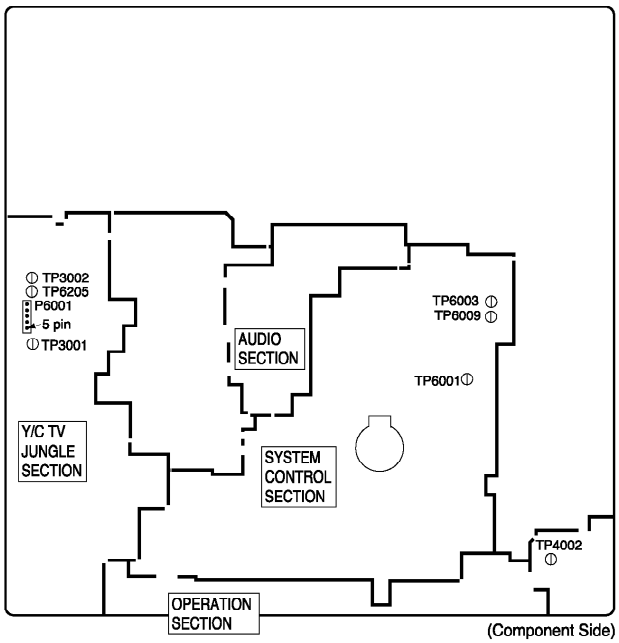
Mode :

STOP

1. **Do not input any signal to the unit.**
2. **Set INPUT SELECT item to LINE in SET UP TV menu to display black screen.**
3. **Select SUB BRIGHT in EVR adjustment mode, and adjust so that the black screen starts to turn gray (lighting only).**

7.4. TEST POINTS AND CONTROL LOCATION

TV/VCR Main C.B.A. (For model with 13/20 inch CRT)



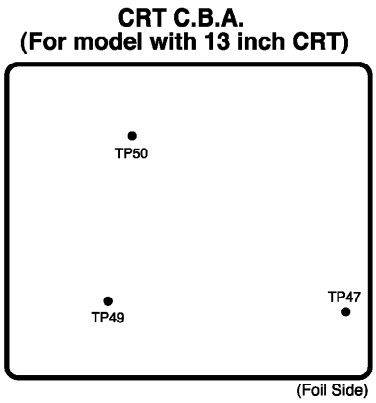
FUNCTION OF IMPORTANT TEST POINTS	
TP3001	Video Signal
TP3002	REC/PB Video envelope signal
TP4002	Normal Audio signal
TP6001	Service Test Point (inhibit sensors)
TP6003	Defeat Auto tracking function (connect to +5V(TP6009))
TP6009	+5V
TP6205	Head SW.

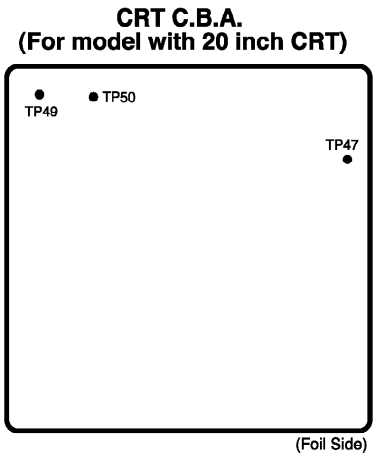
Test Point Information

● Test Point with a Test Pin.

◑ Test Point with a jumper wire across a hole in the P.C.B.

○ Test Point with no Test Pin.





8. SCHEMATIC DIAGRAMS

8.1. SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES

8.2. TV/VCR MAIN SCHEMATIC DIAGRAM

8.3. HEAD AMP SCHEMATIC DIAGRAM

8.4. CRT SCHEMATIC DIAGRAM (Model: AG-513F)

8.5. CRT SCHEMATIC DIAGRAM (Model: AG-520F)

8.6. INTERCONNECTION SCHEMATIC DIAGRAM

8.7. VOLTAGE CHART

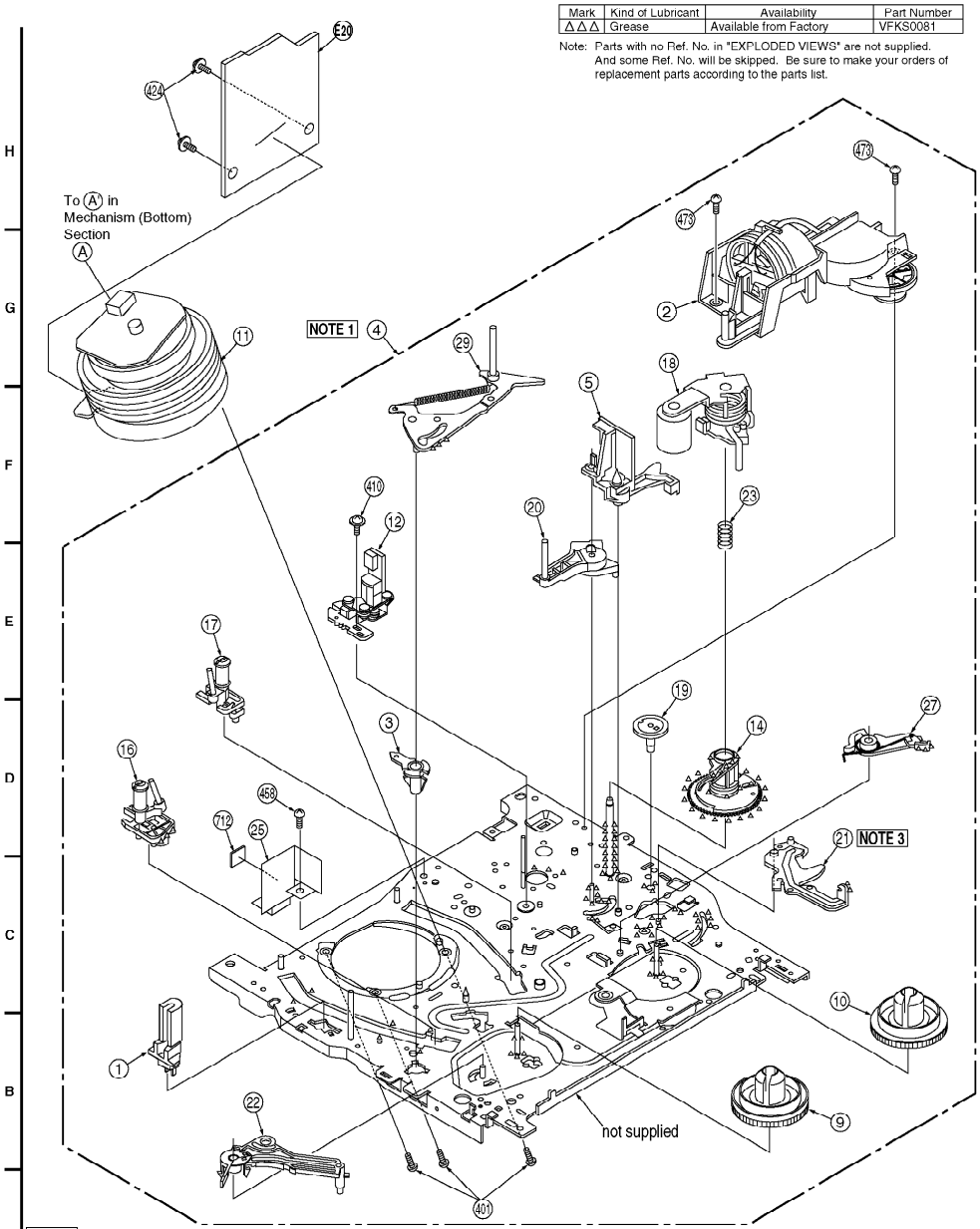
8.8. SIGNAL WAVEFORMS
9. CIRCUIT BOARD LAYOUT
9.1. TV/VCR MAIN C.B.A.
9.2. HEAD AMP C.B.A. / CRT C.B.A.
10. BLOCK DIAGRAMS
11. EXPLODED VIEWS
11.1. MECHANISM (TOP) SECTION

❶ MECHANISM (TOP) SECTION

LUBRICATION POINTS
When the marked parts are replaced, apply the recommended lubricants or adhesive for better maintenance of the unit.

Mark	Kind of Lubricant	Availability	Part Number
△△△	Grease	Available from Factory	VFKS0081

Note: Parts with no Ref. No. in "EXPLODED VIEWS" are not supplied. And some Ref. No. will be skipped. Be sure to make your orders of replacement parts according to the parts list.



NOTE 1: The Mechanical Chassis Sub Ass'y (Ref. No. 4) consists of all the mechanical parts except the Cylinder Unit (Ref. No. 11) and the Cassette Up Ass'y (Ref. No. 61). After replacing the Mechanical Chassis Sub Ass'y, be sure to perform "TAPE INTERCHANGEABILITY ADJUSTMENT" in MECHANICAL ADJUSTMENT procedures.

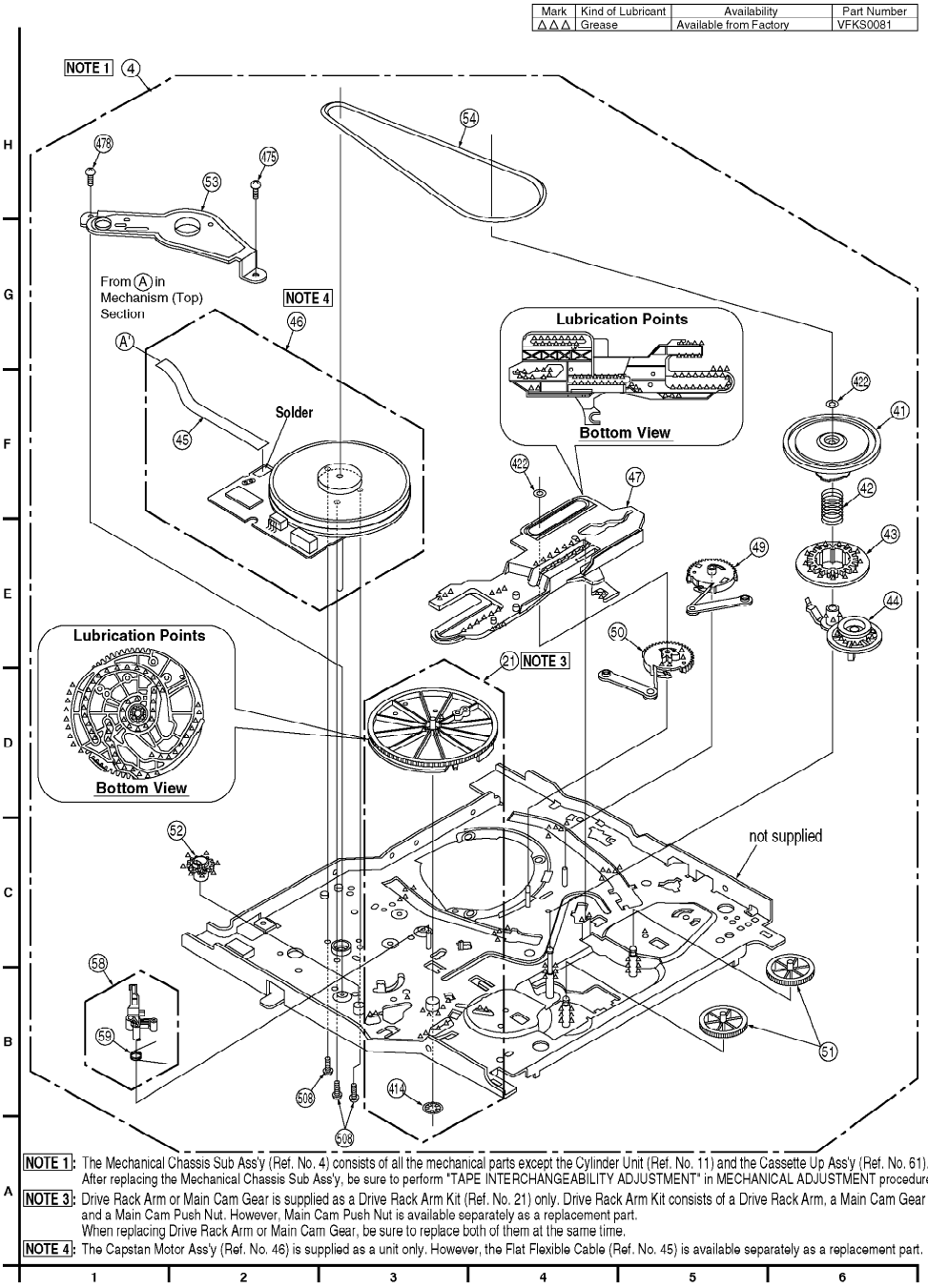
NOTE 3: Drive Rack Arm or Main Cam Gear is supplied as a Drive Rack Arm Kit (Ref. No. 21) only. Drive Rack Arm Kit consists of a Drive Rack Arm, a Main Cam Gear and a Main Cam Push Nut. However, Main Cam Push Nut is available separately as a replacement part.
When replacing Drive Rack Arm or Main Cam Gear, be sure to replace both of them at the same time.

11.2. MECHANISM (BOTTOM) SECTION

❷ MECHANISM (BOTTOM) SECTION

LUBRICATION POINTS
When the marked parts are replaced, apply the recommended lubricants or adhesive for better maintenance of the unit.

Mark	Kind of Lubricant	Availability	Part Number
△△△	Grease	Available from Factory	VFKS0081



NOTE 1: The Mechanical Chassis Sub Ass'y (Ref. No. 4) consists of all the mechanical parts except the Cylinder Unit (Ref. No. 11) and the Cassette Up Ass'y (Ref. No. 61). After replacing the Mechanical Chassis Sub Ass'y, be sure to perform "TAPE INTERCHANGEABILITY ADJUSTMENT" in MECHANICAL ADJUSTMENT procedures.

NOTE 3: Drive Rack Arm or Main Cam Gear is supplied as a Drive Rack Arm Kit (Ref. No. 21) only. Drive Rack Arm Kit consists of a Drive Rack Arm, a Main Cam Gear and a Main Cam Push Nut. However, Main Cam Push Nut is available separately as a replacement part.
When replacing Drive Rack Arm or Main Cam Gear, be sure to replace both of them at the same time.

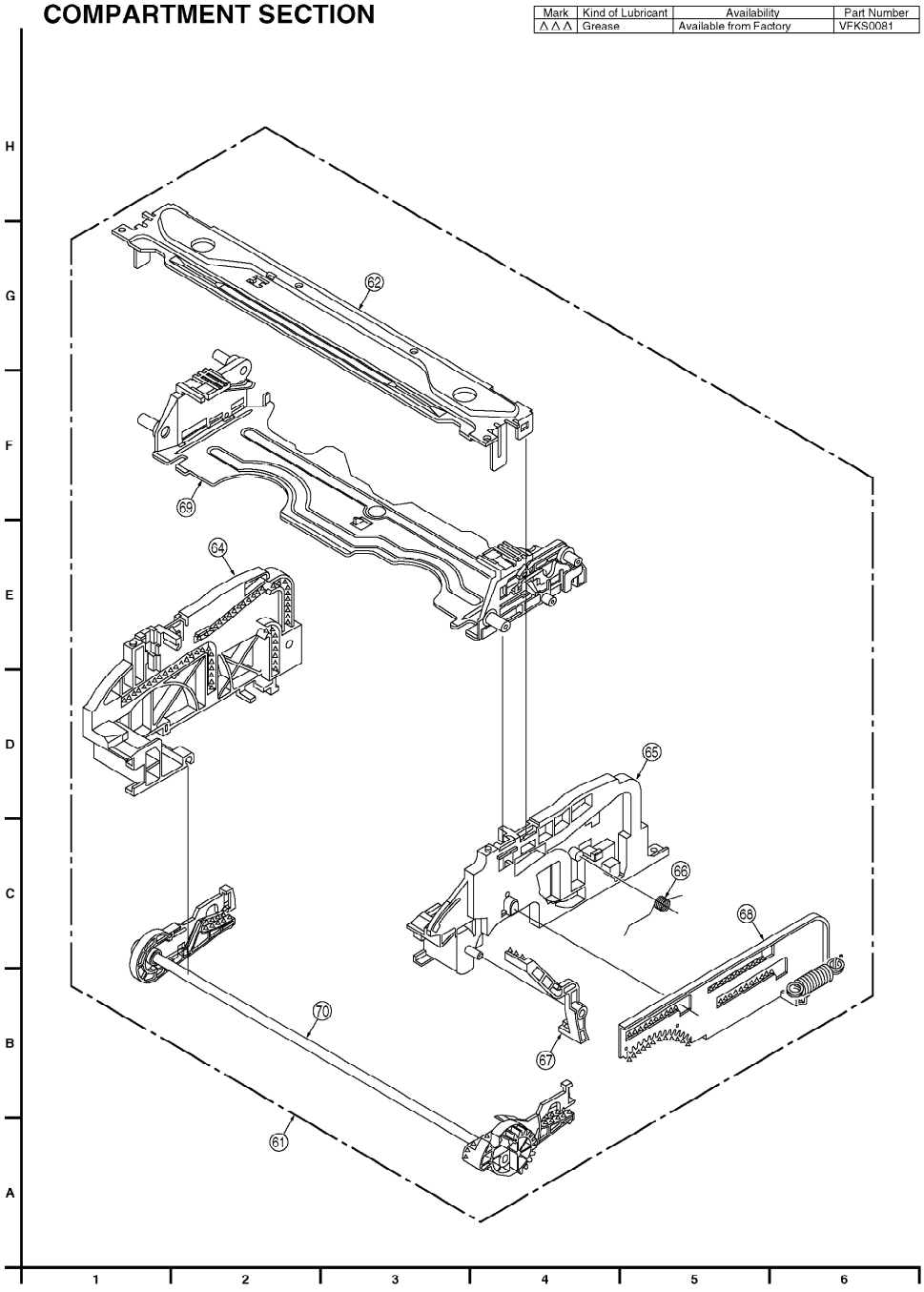
NOTE 4: The Capstan Motor Ass'y (Ref. No. 46) is supplied as a unit only. However, the Flat Flexible Cable (Ref. No. 45) is available separately as a replacement part.

11.3. CASSETTE UP COMPARTMENT SECTION

❸ CASSETTE UP COMPARTMENT SECTION

LUBRICATION POINTS
When the marked parts are replaced, apply the recommended lubricants or adhesive for better maintenance of the unit.

Mark	Kind of Lubricant	Availability	Part Number
△△△	Grease	Available from Factory	VFKS0081



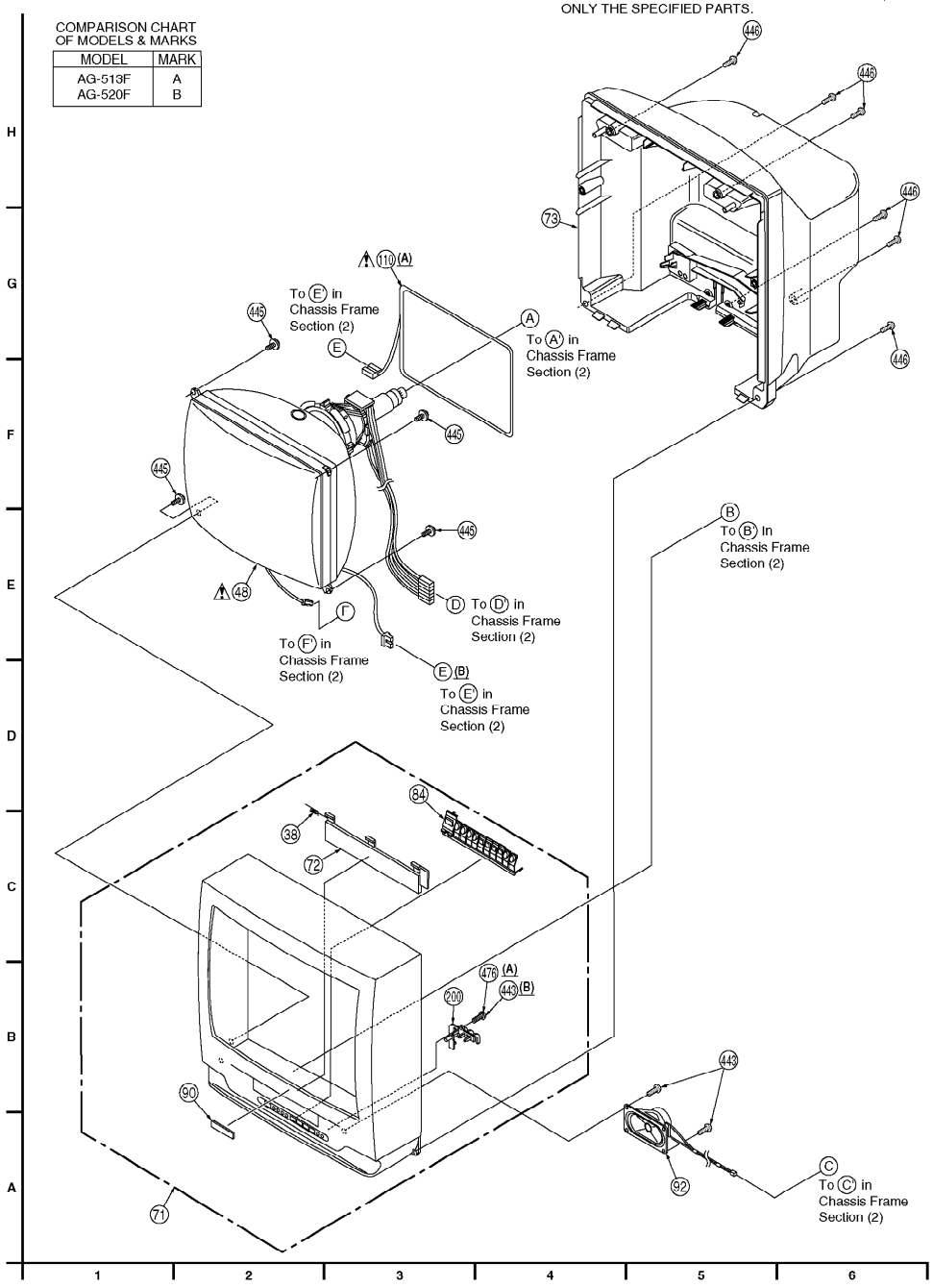
11.4. CHASSIS FRAME SECTION (1)

❹ CHASSIS FRAME SECTION (1)

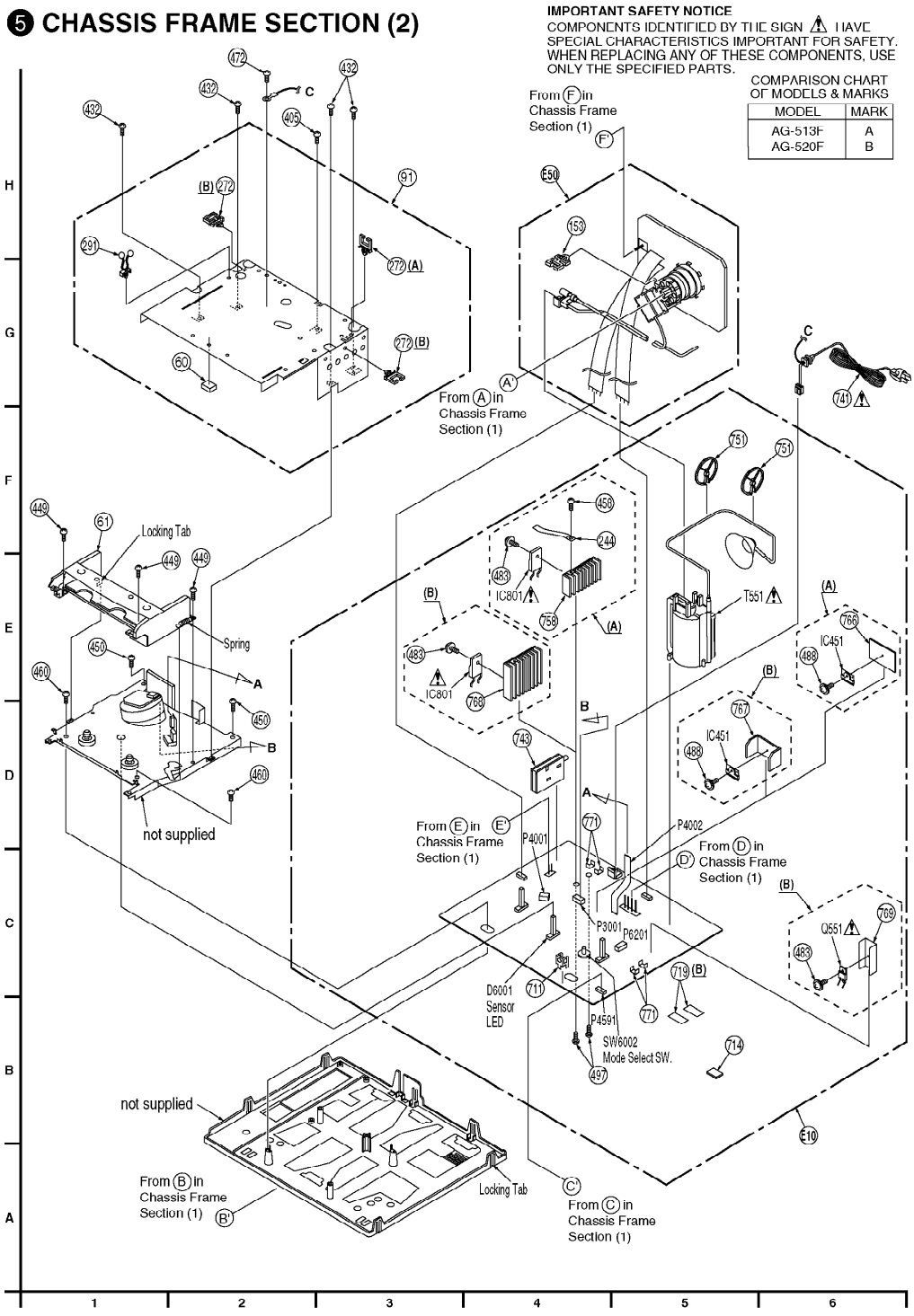
IMPORTANT SAFETY NOTICE
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

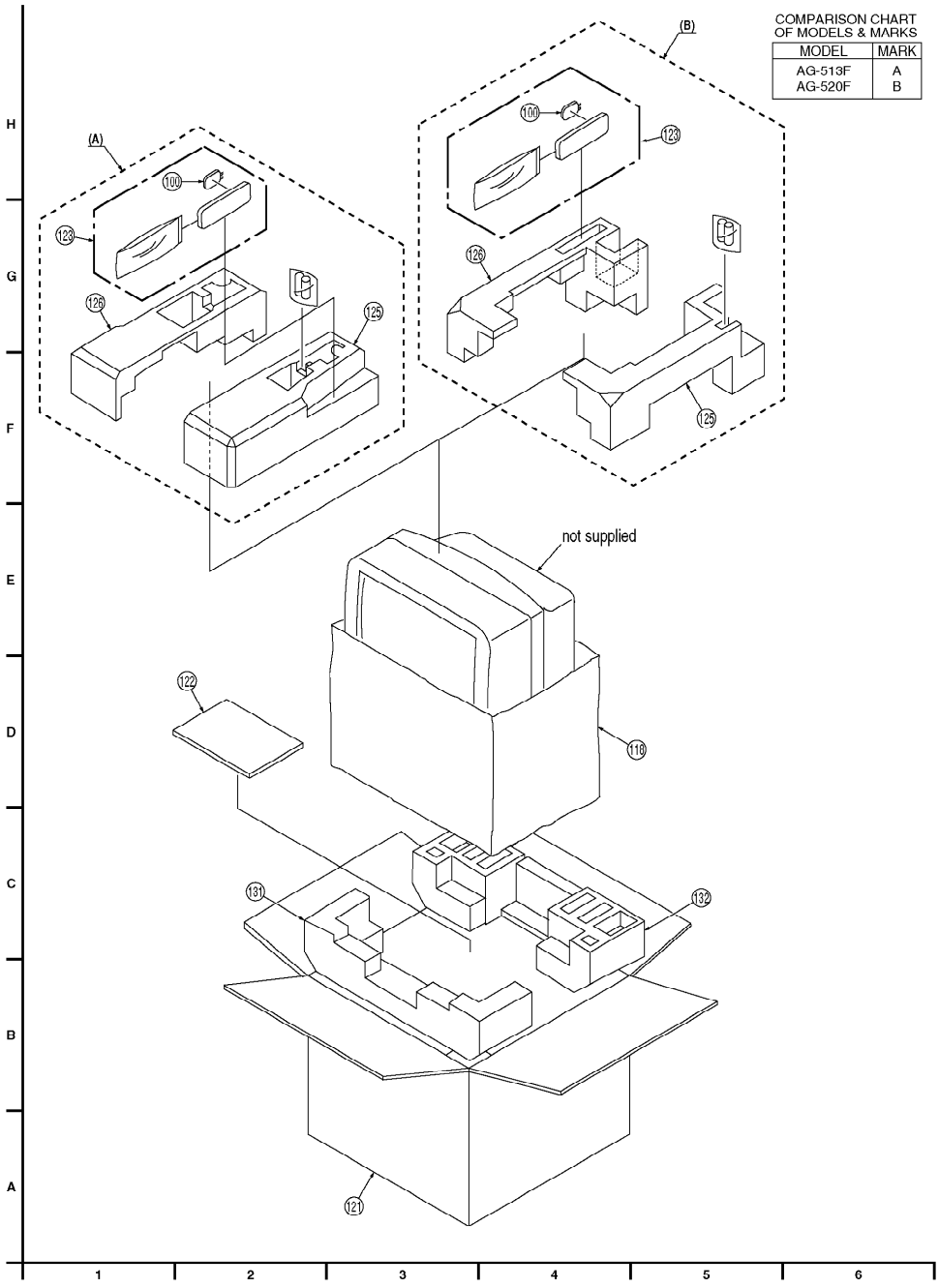

To (E) in Chassis Frame Section (2)
To (A) in Chassis Frame Section (2)
To (B) in Chassis Frame Section (2)
To (D) in Chassis Frame Section (2)
To (F) in Chassis Frame Section (2)
To (E) in Chassis Frame Section (2)
To (C) in Chassis Frame Section (2)

11.5. CHASSIS FRAME SECTION (2)


5 CHASSIS FRAME SECTION (2)
IMPORTANT SAFETY NOTICE
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.
COMPARISON CHART OF MODELS & MARKS
MODEL | MARK
AG-513F | A
AG-520F | B
From (F) in Chassis Frame Section (1)
From (A) in Chassis Frame Section (1)
From (E) in Chassis Frame Section (1)
From (D) in Chassis Frame Section (1)
From (B) in Chassis Frame Section (1)
From (C) in Chassis Frame Section (1)
Locking Tab
Spring
not supplied
IC801
IC451
T551
Q551
D6001 Sensor LED
P4591 SW6002 Mode Select SW.
P4001
P4002
P3001
P6201

11.6. PACKING PARTS AND ACCESSORIES SECTION

❻ PACKING PARTS AND ACCESSORIES SECTION



12. REPLACEMENT PARTS LISTS

BEFORE REPLACING PARTS, READ THE FOLLOWING:

12.1. REPLACEMENT NOTES

12.1.1. General Notes

1. Use only original replacement parts:

To maintain original function and reliability of repaired units, use

only original replacement parts which are listed with their part numbers in the parts list.

2. **IMPORTANT SAFETY NOTICE**
   Components identified by the sign ⚠ have special characteristics important for safety. When replacing any of these components, use only the specified parts.
3. **SPECIAL NOTE**
   All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "ELECTROSTATICALLY SENSITIVE (ES) DEVICES" section of this service manual.
4. **Parts with no Ref. No. in "EXPLODED VIEWS" are not supplied. And some Ref. No. will be skipped. Be sure to make your orders of replacement parts according to the parts list.**
5. **Parts different in shape or size may be used. However, only interchangeable parts will be supplied as service replacement parts.**
6. **Definition of Parts supplier:**
   A. Parts with mark "MKE" in the Remarks column are supplied from MKE.
   B. Parts without mark in the Remarks column are supplied from MKI.
7. **Item numbers with capital letter E (Example: E10, E20,...) in the Ref. No. column are shown in the exploded views.**
8. **Parts whose Ref. Nos. are the same are interchangeable as replacement parts. Any of these parts may be ordered and used as a replacement part.**

12.1.2. Mechanical Replacement Notes

1. **Section No. of parts shown in Exploded Views are indicated in the Remarks column.**
2. **The Mechanical Chassis Sub Ass'y (Ref. No. 4) consists of all the mechanical parts except the Cylinder Unit (Ref. No. 11) and the Cassette Up Ass'y (Ref. No. 61).**
   After replacing the Mechanical Chassis Sub Ass'y, be sure to

perform "TAPE INTERCHANGEABILITY ADJUSTMENT" in MECHANICAL ADJUSTMENT procedures.

3. **In early units, a washer is used.**
   When servicing the washer or the P5 Arm Unit, replace only the P5 Arm Unit with a new one, and remove the washer.
4. **Main Cam Gear is supplied as a Main Cam Gear Kit (Ref. No. 8) only. Main Cam Gear Kit consists of a Main Cam Gear and a Main Cam Push Nut. However, Main Cam Push Nut is available separately as a replacement part.**
5. **The Capstan Motor Ass'y (Ref. No. 46) is supplied as a unit only. However, the Flat Flexible Cable (Ref. No. 45) is available separately as a replacement part.**
6. **The Infrared Remote Control Unit (Ref. No. 123) replacement part is available as a complete assembly unit only. Do not try to disassemble the Infrared Remote Control Unit. However, the battery cover is available separately as a replacement part.**
7. **Main Cam Push Nut (Ref. No. 414) is not reusable.**
   If removed, install a new one.

12.1.3. Electrical Replacement Notes

1. **Unless otherwise specified;**
   All resistors are in Ω, K = 1,000 Ω, M = 1,000 kΩ.
2. **Abbreviation**

RTL:
Retention Time Limited
This indicates that the retention time is limited for this item. After the discontinuation of this item in production, it will no longer be available.

NR:
Non Repairable Board Ass'y

MGF CHIP:
Metal Glaze Film Chip

C CHIP:
Ceramic Chip

COMPLX CMP:
Complex Component

W FLMPRF:
Wirewound Flameproof

C.B.A.:
Circuit Board Assembly

P.C.B.:
Printed Circuit Board

E.S.D.:
Electrostatically Sensitive Devices

3. When replacing 0 Ω resistor, a wire can be substituted for it.

4. Since the UHF/VHF TUNER/TV DEMODULATOR UNIT (Ref. No. 743) has already been pre-adjusted at the factory, do not try to adjust the UHF/VHF TUNER/TV DEMODULATOR UNIT. The UHF/VHF TUNER/TV DEMODULATOR UNIT replacement part is available as a complete assembly unit only.

5. EEPROM IC (IC6004), TV/VCR Main C.B.A. replacement note:
When replacing EEPROM IC (IC6004) or TV/VCR Main C.B.A., be sure to write the initial data with remote control.

6. EEP ROM IC (IC6004) replacement note:
There are 2 types of EEPROM IC (IC6004) used on the Main C.B.A. (DIP TYPE and SOP TYPE). However, these are same reliability, please refer to "TV/VCR MAIN C.B.A." in CIRCUIT BOARD LAYOUT.

7. TV/VCR MAIN C.B.A. replacement note:
When the TV/VCR MAIN C.B.A.s shown below are replaced, the Jumper wire(J801 or J810) of the new TV/VCR MAIN C.B.A. must be cut before use. If the Jumper wire isn't cut, the power does not turned on to the TV circuit. / As for the location of the Jumper wire, please refer to "TV/VCR MAIN C.B.A." in CIRCUIT BOARD LAYOUT.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

12.2. MECHANICAL REPLACEMENT PARTS LIST

Definition of Parts supplier:

1. Parts with mark "MKE" in the Remarks column are supplied from MKE.

2. Parts without mark in the Remarks column are supplied from MKI.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

MECHANICAL REPLACEMENT PARTS

Ref. No.	Part No.	Part Name & Description	Remarks
1	VBSS0033	FULL ERASE HEAD	1
2	LSXK0109	MOTOR BLOCK UNIT	1
3	LSDB0045	TENSION ARM BOSS	1
4	LSXY0463	MECHANICAL CHASSIS SUB ASS'Y	1,2
5	LSMD0209	OPENER PIECE	1
9	LSDR0004	S REEL TABLE	1
10	LSDR0005	T REEL TABLE	1
11	LSEG0069	CYLINDER UNIT	1
12	LSEH0006	AUDIO CONTROL/ERASE HEAD UNIT	1
14	LSDG0112	LIFT GEAR	1
16	VXDS0213	LOADING POST BASE-S UNIT	1
17	VXDS0214	LOADING POST BASE-T UNIT	1
18	LSXL0079	PINCH ARM UNIT	1
19	LSDG0110	INTERMEDIATE GEAR A	1
20	LSXL0078	P5 ARM UNIT	1
21	LSVD0006	DRIVE RACK ARM KIT	1,2
22	LSXL0077	TENSION CONTROL ARM UNIT	1
23	LSMB0282	PINCH ASSIST SPRING	1
25	LSSC0518	A/C SHIELD PLATE	1
27	VXLS1130	T BRAKE UNIT	1
29	VXLS1129	TENSION ARM UNIT	1
38	LSMB0289	CASSETTE DOOR SPRING	4
41	VXPS0389	CENTER CLUTCH UNIT	2
42	VMBS1151	CHANGING GEAR SPRING	2
43	LSDG0114	CHANGING GEAR	2
44	VXLS1091	IDLER ARM UNIT	2
45	LSJW0027	FLEXIBLE FLAT CABLE W/OUT PLUG	2
46	LSEM0078	CAPSTAN MOTOR ASS'Y	2
47	LSMM0007	MAIN ROD	2
48	LXQVB01131	COLOR PICTURE TUBE UNIT (A)	4 ⚠
48	LXQVB01202	COLOR PICTURE TUBE UNIT (B)	4 ⚠
49	VXLS1099	S LOADING ARM UNIT	2

Ref. No.	Part No.	Part Name & Description	Remarks
50	VXLS1098	T LOADING ARM UNIT	2
51	LSDG0116	REEL GEAR	2
52	LSDG0111	INTERMEDIATE GEAR B	2
53	LSMA0532	SUPPORT ANGLE	2
54	LSDV0009	CAPSTAN BELT SQUARE,ELASTOMER 2MM	2
58	LSXL0087	SS BRAKE ARM UNIT	2
59	LSMB0196	SS BRAKE SPRING	2
60	VMFS0311	CUSHION	4
61	LSXY0483	CASSETTE UP ASS'Y	5
62	LSMA0352	TOP PLATE	3
64	LSMD0174	SIDE PLATE L	3
65	LSMD0173	SIDE PLATE R	3
66	LSMB0218	SUPPORT SPRING	3
67	LSML0096	OPENER LEVER	3
68	VXLS1111	DRIVE RACK UNIT	3
69	LSXA0497	HOLDER UNIT	3
70	VXLS1110	WIPER ARM UNIT	3
71	LXQKY06133	FRONT CABINET ASS'Y (A)	4
71	LXQKY05203	FRONT CABINET ASS'Y (B)	4
72	LSKF0455	CASSETTE DOOR-LID (A)	4
72	LSKF0503	CASSETTE DOOR-LID (B)	4
73	LKV60605A	REAR COVER (A)	4
73	LSGV0052	REAR COVER (B)	4
84	LSGU0568	OPERATION BUTTON	4
90	TBMA004	BADGE,ABS RESIN (A)	4
90	TBMA003	BADGE,ABS RESIN (B)	4
91	LXQUS01131K	TOP SHIELD PLATE ASS'Y (A)	5
91	LXQUS01202K	TOP SHIELD PLATE ASS'Y (B)	5
92	LXQAS01J13	SPEAKER UNIT	4
100	LSKF0496	BATTERY COVER	6
110	LLJ69006Z	DEGAUSSING COIL (A)	4 ⚠
118	LPE64003A	BAG,POLYETHYLENE (A)	6
118	LPE64004A	BAG,POLYETHYLENE (B)	6
121	LSPG1500	PACKING CASE,PAPER (A)	6
121	LSPG1501	PACKING CASE,PAPER (B)	6
122	LSQF0713	FAN BAG	6
123	LSSQ0390	INFRARED REMOTE CONTROL UNIT	6
125	LPJ61029A	TOP CUSHION RIGHT,STYROFORM (A)	6
125	LPJ61028A	TOP CUSHION RIGHT,STYROFOAM (B)	6
126	LPJ61030A	TOP CUSHION LEFT,STYROFORM (A)	6
126	LPJ61027A	TOP CUSHION LEFT,STYROFORM (B)	6
131	LPJ62029A	BOTTOM CUSHION FRONT,STYROFORM (A)	6
131	LPJ62027A	BOTTOM CUSHION FRONT,STYROFOAM (B)	6
132	LPJ62030A	BOTTOM CUSHION REAR,STYROFORM (A)	6
132	LPJ62028A	BOTTOM CUSHION REAR,STYROFOAM (B)	6
153	TMM7443-1	CLAMPER	5 ⚠
200	LKK683010A	PANEL LIGHT (A)	4
200	LKK683009A	PANEL LIGHT (B)	4
244	TUX77809	CLAMPER (A)	5
272	TMM77412	CLAMPER	5
291	LML69002A	CLAMPER	5
401	VHDS0475	SCREW,STEEL	1
405	VHDS0496	SCREW W/WASHER,STEEL	5
410	VHDS0498	SCREW W/WASHER,STEEL	1

Ref. No.	Part No.	Part Name & Description	Remarks
414	VHNS0070	MAIN CAM PUSH NUT,STEEL	2
422	XWGV2D5G	WASHER,NYLON	2
424	XYC26+SF6J	SCREW W/WASHER,STEEL	1
432	XTV3+8JR	TAPPING SCREW,STEEL	5
443	XTV4+12A	TAPPING SCREW,STEEL	4
445	THE492-4	SCREW W/WASHER,STEEL (A)	4
445	LHT60002Y	SCREW,STEEL (B)	4
446	XTV4+16A	TAPPING SCREW,STEEL	4
449	VHDS0493	TAPPING SCREW,STEEL	5
450	VHDS0309	SCREW,STEEL	5
458	XTV3+8J	TAPPING SCREW,STEEL	1,5
460	XTN4+12A	TAPPING SCREW,STEEL	5
472	VHDS0297	TAPPING SCREW,STEEL	5
473	XYN26+C6	SCREW W/WASHER,STEEL	1
475	XTV26+5FJ	TAPPING SCREW,STEEL	2
476	XTV3+12G	TAPPING SCREW,STEEL (A)	4
478	VHDS0495	SCREW,STEEL	2
483	XYN3+F10S	SCREW W/WASHER,STEEL	5
488	XYN3+F6S	SCREW W/WASHER,STEEL	5
497	XTV3+10J	TAPPING SCREW,STEEL	5
508	XTB26+6J	TAPPING SCREW,STEEL	2
712	VMTS0035	CUSHION,RUBBER	1
711	PNA4611M00HC	INFRARED RECEIVER UNIT	5
714	VMTS0059	CUSHION,RUBBER	5
719	VMFS0136	CUSHION (B)	5
741	LSJA0380	AC CORD W/PLUG,120V	5 ⚠
743	ENG36706GY	TUNER,UHF/VHF NR (B)	5
751	LML69001A	ANODE LEAD CLAMPER	5
758	TUC77616	GROUNDING PLATE,AL (A)	5
766	TUC76677-1	HEAT SINK PLATE,STEEL (A)	5
767	TUC77626	HEAT SINK PLATE,STEEL (B)	5
768	TUC77603-1	GROUNDING PLATE,AL (B)	5
769	LUS23005B	HEAT SINK PLATE (B)	5
771	EYF52BC	FUSE HOLDER	5
E10	LSEP2012X	TV/VCR MAIN C.B.A. (A)	5 RTL
E10	LSEP2012E	TV/VCR MAIN C.B.A. (B)	5 RTL
E20	LSEP2009A	HEAD AMP C.B.A.	1 RTL
E50	LRP63004D	CRT C.B.A. (A)	5 RTL
E50	LRP63022B	CRT C.B.A. (B)	5 RTL

SERVICE FIXTURES AND TOOLS

Ref. No.	Part No.	Part Name & Description	Remarks
	VFMS0003H6	VHS ALIGNMENT TAPE	MKE
	VFKS0081	GREASE	MKE
	VFK0329	POST ADJUSTMENT DRIVER	MKE
	VFK27	HEAD CLEANING STICK	MKE
	VFK0330	H-POSITION ADJUSTMENT DRIVER	MKE

12.3. ELECTRICAL REPLACEMENT PARTS LIST

Definition of Parts supplier:

1. All parts are supplied from MKI.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

PRINTED CIRCUIT BOARD ASSEMBLY

Ref. No.	Part No.	Part Name & Description	Remarks
E10	LSEP2012X	TV/VCR MAIN C.B.A. (A)	E.S.D. RTL
E10	LSEP2012E	TV/VCR MAIN C.B.A. (B)	E.S.D. RTL
E20	LSEP2009A	HEAD AMP C.B.A.	RTL
E50	LRP63004D	CRT C.B.A. (A)	RTL
E50	LRP63022B	CRT C.B.A. (B)	RTL

12.3.1. TV/VCR MAIN C.B.A.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

INTEGRATED CIRCUITS

Ref. No.	Part No.	Part Name & Description	Remarks
IC451	C1AA00000024	IC, LINEAR	
IC501	CNC1S101R1KT	IC, LINEAR	⚠
IC501	CNC1S101S1KT	IC, LINEAR	⚠
IC502	CNC1S101R1KT	IC, LINEAR (A)	⚠
IC502	CNC1S101R2KT	IC, LINEAR (B)	⚠
IC801	C5HABZZ00051	IC, LINEAR	⚠
IC1001	CNC1S101R1KT	IC, LINEAR	⚠
IC1001	CNC1S101S1KT	IC, LINEAR	⚠
IC1002	C0DAEMZ00005	IC, LINEAR	
IC1002	B1AZKD000001	IC, LINEAR	
IC1002	C0DAEMZ00001	IC, LINEAR	
IC3001	AN3479FBP-A	IC, LINEAR	
IC3201	MN3885S	IC, LINEAR	
IC4501	C1AA00000652	IC, LINEAR	
IC5301	AN15167A-VT	IC, LINEAR	
IC6001	MN101D06GCR	IC, 8BIT MICROCONTROOLER	E.S.D.
IC6002	B3NAA0000049	PHOTO INTERRUPUTER	
IC6003	B3NAA0000049	PHOTO INTERRUPUTER	
IC6004	C3EBCC000038	IC, 1K EEP ROM	E.S.D.
IC6004	AT24C01A10PI	IC, 1K EEP ROM	E.S.D.
IC6004	AT24C01A10SI	IC, 1K EEP ROM	E.S.D.
IC6004	BR24C01AWE2	IC, 1K EEP ROM	E.S.D.
IC6004	C3EACZ000002	IC, 1K EEP ROM	E.S.D.
IC6004	M24C01-MN6	IC, 1K EEP ROM	E.S.D.
IC6005	C0EBJ0000080	IC, CMOS STANDARD LOGIC	E.S.D.
IC6005	C0EBJ0000099	IC, CMOS STADNARD LOGIC	E.S.D.

Ref. No.	Part No.	Part Name & Description	Remarks
IC6005	RN5VS47CA-TR	IC, CMOS STANDARD LOGIC	E.S.D.

TRANSISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
Q431	2SA733-TQ	TRANSISTOR SI PNP	
Q431	2SA1175	TRANSISTOR SI PNP	
Q431	2SA1175-TH	TRANSISTOR SI PNP	
Q501	B1AACN000013	TRANSISTOR SI NPN	
Q531	2SA733-TQ	TRANSISTOR SI PNP	
Q531	2SA1175	TRANSISTOR SI PNP	
Q531	2SA1175-TH	TRANSISTOR SI PNP	
Q532	2SC945A-TQ	TRANSISTOR SI NPN	
Q532	2SC2785-TH	TRANSISTOR SI NPN	
Q532	2SC2785-TJ	TRANSISTOR SI NPN	
Q551	B1BAET000006	TRANSISTOR SI NPN (A)	⚠
Q551	B1GARRAB0001	TRANSISTOR SI NPN (B)	⚠
Q571	2SD0601A0L	TRANSISTOR SI NPN CHIP	
Q571	B1ABCF000011	TRANSISTOR SI NPN CHIP	
Q571	B1ABCF000106	TRANSISTOR SI NPN	
Q571	B1ABCF000107	TRANSISTOR SI NPN	
Q581	B1ACBM000001	TRANSISTOR SI NPN	
Q581	2SA17670QA	TRANSISTOR SI PNP CHIP	
Q581	2SB12210QA	TRANSISTOR SI PNP CHIP	
Q801	2SC945A-TKA	TRANSISTOR SI NPN	
Q801	2SC1684-Q	TRANSISTOR SI NPN	
Q801	2SC1684-S	TRANSISTOR SI NPN	
Q801	2SC16840RA	TRANSISTOR SI NPN	
Q801	2SC2785-TE	TRANSISTOR SI NPN	
Q801	2SC2785-TF	TRANSISTOR SI NPN	
Q801	2SC2785-TH	TRANSISTOR SI NPN	
Q801	2SC2785-TJ	TRANSISTOR SI NPN	
Q801	2SC2785-TK	TRANSISTOR SI NPN	
Q801	2SC3311AQA	TRANSISTOR SI NPN	
Q801	2SC3311ARA	TRANSISTOR SI NPN	
Q801	2SC3311ASA	TRANSISTOR SI NPN	
Q801	2SC945A-TPA	TRANSISTOR SI NPN	
Q801	2SC945A-TQA	TRANSISTOR SI NPN	
Q1001	2SC4953001KT	TRANSISTOR SI NPN	⚠
Q1001	B1BADP000012	TRANSISTOR SI PNP	⚠
Q1001	2SC4533003KT	TRANSISTOR SI NPN	⚠
Q1001	2SC5842001KT	TRANSISTOR SI NPN	⚠
Q1002	2SD225900A	TRANSISTOR SI NPN	
Q1051	B1BACC000010	TRANSISTOR SI NPN	
Q1051	2SD1581-T	TRANSISTOR SI NPN	
Q1052	2SD0601AHL	TRANSISTOR SI NPN CHIP	
Q1052	B1ABCF000011	TRANSISTOR SI NPN CHIP	
Q1052	B1ABCF000106	TRANSISTOR SI NPN	
Q1053	2SD235800A	TRANSISTOR SI NPN CHIP	
Q1053	B1AAQB000002	TRANSISTOR SI NPN	
Q3001	2SB1218A0L	TRANSISTOR SI PNP CHIP	
Q3001	B1ADCF000063	TRANSISTOR SI PNP CHIP	
Q3001	B1ADCF000075	TRANSISTOR SI PNP	

Ref. No.	Part No.	Part Name & Description	Remarks
Q3001	B1ADCF000076	TRANSISTOR SI PNP	
Q3002	2SD1819A0L	TRANSISTOR SI NPN CHIP	
Q3002	B1ABCF000020	TRANSISTOR SI NPN CHIP	
Q3002	B1ABCF000111	TRANSISTOR SI NPN	
Q3002	B1ABCF000112	TRANSISTOR SI NPN	
Q3301	2SD1819A0L	TRANSISTOR SI NPN CHIP	
Q3301	B1ABCF000020	TRANSISTOR SI NPN CHIP	
Q3301	B1ABCF000111	TRANSISTOR SI NPN	
Q3301	B1ABCF000112	TRANSISTOR SI NPN	
Q4001	2SB1218A0L	TRANSISTOR SI PNP CHIP	
Q4001	B1ADCF000063	TRANSISTOR SI PNP CHIP	
Q4001	B1ADCF000075	TRANSISTOR SI PNP	
Q4001	B1ADCF000076	TRANSISTOR SI PNP	
Q4002	2SD1819AHL	TRANSISTOR SI NPN CHIP	
Q4002	B1ABCF000112	TRANSISTOR SI NPN	
Q4003	2SD1819AHL	TRANSISTOR SI NPN CHIP	
Q4003	B1ABCF000112	TRANSISTOR SI NPN	
Q4101	2SD0601ARL	TRANSISTOR SI NPN CHIP	
Q4171	2SD0601A0L	TRANSISTOR SI NPN CHIP	
Q4171	B1ABCF000011	TRANSISTOR SI NPN CHIP	
Q4171	B1ABCF000106	TRANSISTOR SI NPN	
Q4171	B1ABCF000107	TRANSISTOR SI NPN	
Q5301	2SD1819A0L	TRANSISTOR SI NPN CHIP	
Q5301	B1ABCF000020	TRANSISTOR SI NPN CHIP	
Q5301	B1ABCF000111	TRANSISTOR SI NPN	
Q5301	B1ABCF000112	TRANSISTOR SI NPN	
Q5901	2SD225900A	TRANSISTOR SI NPN	
Q6001	2SB0709A0L	TRANSISTOR SI PNP CHIP	
Q6001	B1ADCF000001	TRANSISTOR SI PNP CHIP	
Q6002	2SD0601A0L	TRANSISTOR SI NPN CHIP	
Q6002	B1ABCF000011	TRANSISTOR SI NPN CHIP	
Q6003	2SD0601A0L	TRANSISTOR SI NPN CHIP	
Q6003	B1ABCF000011	TRANSISTOR SI NPN CHIP	
Q6004	2SB1218A0L	TRANSISTOR SI PNP CHIP	
Q6004	B1ADCF000063	TRANSISTOR SI PNP CHIP	
Q6005	2SB0709A0L	TRANSISTOR SI PNP CHIP	
Q6005	B1ADCF000001	TRANSISTOR SI PNP CHIP	
Q6006	2SD1819A0L	TRANSISTOR SI NPN CHIP	
Q6009	VEKS5707	PHOTO SENSOR UNIT	
Q6010	VEKS5707	PHOTO SENSOR UNIT	

DIODES

Ref. No.	Part No.	Part Name & Description	Remarks
D401	B0EAKL000049	DIODE SI	
D401	B0EAKL000044	DIODE SI	
D401	B0EAKL000045	DIODE SI	
D502	MA2C165001VT	DIODE SI	
D502	B0AACK000004	DIODE SI	
D502	1SS119	DIODE SI	
D503	B0HAGP000011	DIODE SI	
D503	B0HAJP000012	DIODE SI	
D504	MAZ40470MF	DIODE ZENER 4.7V	
D504	MAZ40470HF	DIODE ZENER 4.7V	
D504	RD4.7ESAB	DIODE ZENER 4.7V	
D504	RD4.7ESAB2	DIODE ZENER 4.7V	
D504	04AZ4.7ZTPA7	DIODE ZENER 4.7V	
D507	MA2C165001VT	DIODE SI	
D507	B0AACK000004	DIODE SI	
D507	1SS119	DIODE SI	
D553	B0HAGP000011	DIODE SI	
D553	B0HAJP000012	DIODE SI	
D554	B0AAEL000001	DIODE SI	
D554	MA2C16700E	DIODE SI	
D556	MA2C18500E	DIODE SI	
D558	B0HAGP000011	DIODE SI	
D558	B0HAJP000012	DIODE SI	
D560	ERB44-04V	DIODE SI	
D571	MAZ40470MF	DIODE ZENER 4.7V	
D571	B0BA4R600003	DIODE ZENER 4.7V	
D571	RD4.7ESAB2	DIODE ZENER 4.7V	
D572	MAZ4110NHF	DIODE ZENER 11V	
D573	MA2C165001VT	DIODE SI	
D573	B0AACK000004	DIODE SI	
D573	1SS119	DIODE SI	
D574	MA2C165001VT	DIODE SI	
D574	B0AACK000004	DIODE SI	
D574	1SS119	DIODE SI	
D591	D4DDF5R00002	THERMISTOR	⚠
D591	VRPSKF5JM050	THERMISTOR	⚠
D801	B0AAKT000010	DIODE SI	⚠
D801	B0AAKT000009	DIODE SI	⚠
D801	B0EAKT000007	DIODE SI	⚠
D801	B0EAKT000027	DIODE SI	⚠
D801	B0EAKT000030	DIODE SI	⚠
D801	B0EALT000004	DIODE SI	⚠
D802	B0AAKT000010	DIODE SI	⚠
D802	B0AAKT000009	DIODE SI	⚠
D802	B0EAKT000007	DIODE SI	⚠
D802	B0EAKT000027	DIODE SI	⚠
D802	B0EAKT000030	DIODE SI	⚠
D802	B0EALT000004	DIODE SI	⚠
D803	B0AAKT000010	DIODE SI	⚠
D803	B0AAKT000009	DIODE SI	⚠
D803	B0EAKT000007	DIODE SI	⚠

Ref. No.	Part No.	Part Name & Description	Remarks
D803	B0EAKT000027	DIODE SI	⚠
D803	B0EAKT000030	DIODE SI	⚠
D803	B0EALT000004	DIODE SI	⚠
D804	B0AAKT000010	DIODE SI	⚠
D804	B0AAKT000009	DIODE SI	⚠
D804	B0EAKT000007	DIODE SI	⚠
D804	B0EAKT000027	DIODE SI	⚠
D804	B0EAKT000030	DIODE SI	⚠
D804	B0EALT000004	DIODE SI	⚠
D805	MA2C16700E	DIODE SI	
D805	B0AAEL000001	DIODE SI	
D881	ERZV10V361CS	SUEGE ABSORBER	⚠
D881	D4EAA3610001	SURGE ABSORBER	⚠
D882	ERZV10V361CS	SUEGE ABSORBER	⚠
D882	D4EAA3610001	SURGE ABSORBER	⚠
D1001	DB105G	DIODE SI	⚠
D1001	B0EBKR000003	DIODE SI	⚠
D1001	B0EBKR000020	DIODE SI	⚠
D1001	B0EBKR000024	DIODE SI	⚠
D1002	B0HAHP000014	DIODE SI	
D1002	B0HAJP000007	DIODE SI	
D1002	B0HAMP000061	DIODE SI	
D1002	B0HAMP000069	DIODE SI	
D1003	B0HAHP000014	DIODE SI	
D1003	B0HAJP000007	DIODE SI	
D1003	B0HAMP000061	DIODE SI	
D1003	B0HAMP000069	DIODE SI	
D1005	B0HAHP000014	DIODE SI	
D1005	B0HAJP000007	DIODE SI	
D1005	B0HAMP000061	DIODE SI	
D1005	B0HAMP000069	DIODE SI	
D1006	B0HAML000015	DIODE SI	
D1006	B0HANL000012	DIODE SI	
D1008	B0JAME000079	DIODE SI	
D1008	B0JAME000049	DIODE SI	
D1008	B0JANE000011	DIODE SI	
D1008	B0JANE000022	DIODE SI	
D1015	MA2180LA	DIODE ZENER 18V	⚠
D1015	B0BA01800025	DIODE SI	⚠
D1015	1N4746A-T	DIODE ZENER 18V	⚠
D1015	1N4746ARL	DIODE ZENER 18V	⚠
D1016	MA2C165001VT	DIODE SI	
D1016	B0AACK000004	DIODE SI	
D1016	1SS119	DIODE SI	
D1051	MAZ4110NHF	DIODE ZENER 11V	
D4171	MA2C165001VT	DIODE SI	
D4171	B0AACK000004	DIODE SI	
D4171	1SS119	DIODE SI	
D4528	MAZ40390HF	DIODE ZENER 3.9V	
D4591	MAZ41100LF	DIODE ZENER 11V	
D4591	MAZ4110NHF	DIODE ZENER 11V	

Ref. No.	Part No.	Part Name & Description	Remarks
D4592	MAZ41100LF	DIODE ZENER 11V	
D4592	MAZ4110NHF	DIODE ZENER 11V	
D5501	MAZ40620L1KT	DIODE ZENER 6.2V	⚠
D5602	MA2C165001VT	DIODE SI	
D5602	B0AACK000004	DIODE SI	
D5602	1SS119	DIODE SI	
D5603	MA2C165001VT	DIODE SI	
D5603	B0AACK000004	DIODE SI	
D5603	1SS119	DIODE SI	
D6001	VEKS5708	SENSOR LED UNIT	
D6003	MA2C165001VT	DIODE SI	
D6003	B0AACK000004	DIODE SI	
D6003	1SS119	DIODE SI	
D6005	MA2C165001VT	DIODE SI	
D6005	B0AACK000004	DIODE SI	
D6005	1SS119	DIODE SI	
D6301	B3AAA0000538	LIGHT EMITTING DIODE RED	
D6302	B3ACA0000192	LIGHT EMITTING DIODE ORANGE	
D6303	B3ABA0000400	LIGHT EMITTING DIODE GREEN	

RESISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
R401	ERDS2TJ821T	CARBON 1/4W 820 (A)	
R401	ERDS2TJ471T	CARBON 1/4W 470 (B)	
R402	ERJ6GEYJ183V	MGF CHIP 1/10W 18K (A)	
R402	ERJ6GEYJ223V	MGF CHIP 1/10W 22K (B)	
R409	ERJ6GEYJ273V	MGF CHIP 1/10W 27K (A)	
R409	ERJ6GEYJ333V	MGF CHIP 1/10W 33K (B)	
R410	ERDS2TJ152	CARBON 1/4W 1.5K (A)	
R410	ERDS2TJ392	CARBON 1/4W 3.9K (B)	
R411	ERJ6GEYJ823V	MGF CHIP 1/10W 82K	
R413	ERJ6GEYJ183V	MGF CHIP 1/10W 18K (A)	
R413	ERJ6GEYJ273V	MGF CHIP 1/10W 27K (B)	
R414	ERDS1FJ2R2	CARBON 1/2W 2.2 (A)	⚠
R414	ERDS1FJ1R2P	CARBON 1/2W 1.2 (B)	⚠
R422	ERD25FJ101P	CARBON 1/4W 100	⚠
R427	ERQ14ZJ1R5P	FUSE 1/4W 1.5 (A)	⚠
R427	ERQ14AJ5R6P	FUSE 1/4W 5.6 (B)	⚠
R431	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R432	ERJ6GEYJ473V	MGF CHIP 1/10W 47K (A)	
R432	ERJ6GEYJ563V	MGF CHIP 1/10W 56K (B)	
R433	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R434	ERDS2TJ103	CARBON 1/4W 10K	
R435	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R436	ERJ6GEYJ104V	MGF CHIP 1/10W 100K	
R466	ERJ6GEYJ683V	MGF CHIP 1/10W 68K	
R468	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R471	ERDS1FJ152P	CARBON 1/2W 1.5K	⚠
R472	ERDS2TJ332T	CARBON 1/4W 3.3K	
R480	ERDS2TJ332T	CARBON 1/4W 3.3K (B)	
R501	ERJ6GEYJ471V	MGF CHIP 1/10W 470	

Ref. No.	Part No.	Part Name & Description	Remarks
R502	ERJ6GEYJ332V	MGF CHIP 1/10W 3.3K	
R503	EROS2THF9101	PRECISION METAL FILM 1/4W 9.1K (A)	⚠
R503	EROS2THF8201	PRECISION METAL FILM 1/4W 8.2K (B)	⚠
R503	EROS2TKF9101	PRECISION METAL FILM 1/4W 9.1K (A)	⚠
R503	EROS2TKF8201	PRECISION METAL FILM 1/4W 8.2K (B)	⚠
R503	VRESR4TF9101	PRECISION METAL FILM 1/4W 9.1K (A)	⚠
R503	VRESR4TF8201	PRECISION METAL FILM 1/4W 8.2K (B)	⚠
R504	ERJ6GEY0R00V	MGF CHIP 1/10W 0	
R505	ERDS2TJ561	CARBON 1/4W 560	
R509	ERDS2TJ101	CARBON 1/4W 100	
R511	ERG2ANJ222H	METAL OXIDE 2W 2.2K	
R516	LAR05272J09	W FLMPRF 5W 2700 (A)	
R516	LAR05222J09	W FLMPRF 5W 2.2K (B)	
R517	ERDS2TJ472T	CARBON 1/4W 4700	
R519	ERDS2TJ123T	CARBON 1/4W 12K	
R520	ERDS2TJ562T	CARBON 1/4W 5.6K	
R525	ERDS2TJ122T	CARBON 1/4W 1200	
R529	ERDS2TJ103	CARBON 1/4W 10K	
R531	ERDS2TJ223	CARBON 1/4W 22K	
R533	ERDS2TJ332T	CARBON 1/4W 3.3K (A)	
R533	ERDS2TJ152	CARBON 1/4W 1.5K (B)	
R534	ERDS2TJ681	CARBON 1/4W 680	
R535	ERDS2TJ471T	CARBON 1/4W 470	
R536	ERG2ANJ153H	METAL OXIDE 2W 15K	
R536	ERG2ANJP153H	METAL OXIDE 2W 15K	
R537	ERG2ANJ153H	METAL OXIDE 2W 15K	
R537	ERG2ANJP153H	METAL OXIDE 2W 15K	
R538	ERDS2TJ473T	CARBON 1/4W 47K	
R539	ERDS2TJ473T	CARBON 1/4W 47K	
R540	ERDS2TJ562T	CARBON 1/4W 5.6K	
R541	ERDS2TJ222T	CARBON 1/4W 2.2K	
R542	ERDS2TJ473T	CARBON 1/4W 47K	
R543	ERDS2TJ102	CARBON 1/4W 1K	
R544	ERDS2TJ101	CARBON 1/4W 100	
R545	ERDS2TJ152	CARBON 1/4W 1.5K	
R546	ERDS2TJ223	CARBON 1/4W 22K	
R552	ERDS2TJ472T	CARBON 1/4W 4700	
R553	ERDS2TJ102	CARBON 1/4W 1K	
R554	ERDS2TJ103	CARBON 1/4W 10K (A)	
R554	ERDS2TJ123T	CARBON 1/4W 12K (B)	
R555	ERDS2TJ154T	CARBON 1/4W 150K (A)	
R555	ERDS2TJ823T	CARBON 1/4W 82K (B)	
R556	ERDS2TJ823T	CARBON 1/4W 82K	
R557	ERG2SJ471H	METAL OXIDE 2W 470 (A)	
R557	ERG2SJ331H	METAL OXIDE 2W 330 (B)	
R558	ERG2ANJ471H	METAL OXIDE 2W 470 (A)	
R558	ERG2ANJ561H	METAL OXIDE 2W 560 (B)	
R559	ERDS2TJ123T	CARBON 1/4W 12K (B)	
R561	ERQ1CJP2R2S	FUSE 1W 2.2 (A)	⚠
R561	ERQ1CKPR47S	FUSE 1W 0.47 (B)	⚠
R562	ERF2AK3R9P	W FLMPRF 2W 3.9 (B)	
R571	ERDS2TJ101	CARBON 1/4W 100	
R572	ERJ6GEYJ331V	MGF CHIP 1/10W 330	

Ref. No.	Part No.	Part Name & Description	Remarks
R573	ERDS2TJ221	CARBON 1/4W 220	
R574	ERJ6GEYJ273V	MGF CHIP 1/10W 27K	
R581	ERDS1FJ2R2	CARBON 1/2W 2.2 (A)	⚠
R581	ERDS1FJ1R5P	CARBON 1/2W 1.5 (B)	⚠
R582	ERDS1FJ3R9P	CARBON 1/2W 3.9 (A)	⚠
R582	ERDS1FJ1R5P	CARBON 1/2W 1.5 (B)	⚠
R584	ERDS2TJ562T	CARBON 1/4W 5.6K (A)	
R584	ERDS2TJ272	CARBON 1/4W 2.7K (B)	
R585	ERDS2TJ473T	CARBON 1/4W 47K	
R586	ERDS2TJ393T	CARBON 1/4W 39K	
R801	ERF3AKR82	W FLMPRF 3W 0.82	⚠
R802	ERDS1FJ103P	CARBON 1/2W 10K	⚠
R802	ERDS1FPJ103	CARBON 1/2W 10K	⚠
R804	ERF10ZJ331	W FLMPRF 10W 330 (A)	
R804	ERF15ZJ181	W FLMPRF 15W 180 (B)	
R805	ERDS2TJ104	CARBON 1/4W 100K	
R806	ERQ14AJ470P	FUSE 1/4W 47	⚠
R810	ERDS2TJ103	CARBON 1/4W 10K	
R813	ERDS2TJ104	CARBON 1/4W 100K	
R818	VRESC2TK825T	SOLID 1/2W 8.2M	⚠
R865	ERDS2TJ222T	CARBON 1/4W 2.2K	
R1003	D0AF334JA038	CARBON 1/2W 330K	
R1004	ERG2SJ333H	METAL OXIDE 2W 33K	
R1005	ERG1SJ560P	METAL OXIDE 1W 56	
R1006	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R1007	ERDS2TJ101	CARBON 1/4W 100	
R1008	ERDS2TJ392	CARBON 1/4W 3.9K	
R1010	ERD25FJ100P	CARBON 1/4W 10	⚠
R1010	ERD25FPJ100P	CARBON 1/4W 10	⚠
R1010	VRESF4FJ100P	CARBON 1/4W 10	⚠
R1014	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R1015	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R1016	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R1017	D1BD2431A016	MGF CHIP 2.43K	
R1018	D0HD222ZA002	MGF CHIP 2.2K	
R1025	ERDS2TJ300	CARBON 1/2W 30	
R1026	ERDS2TJ300	CARBON 1/2W 30	
R1051	ERJ6GEYJ122V	MGF CHIP 1/10W 1.2K	
R1052	ERDS2TJ153	CARBON 1/4W 15K	
R1053	ERDS2TJ153	CARBON 1/4W 15K	
R1057	ERDS2TJ331	CARBON 1/4W 330	
R1058	ERJ6GEYJ104V	MGF CHIP 1/10W 100K	
R3001	ERDS2TJ101	CARBON 1/4W 100	
R3006	ERDS2TJ101	CARBON 1/4W 100	
R3016	ERJ6GEYJ121V	MGF CHIP 1/10W 120	
R3017	ERJ6GEYJ331V	MGF CHIP 1/10W 330	
R3024	ERJ6GEYJ471V	MGF CHIP 1/10W 470	
R3025	ERJ6GEYJ125V	MGF CHIP 1/10W 1.2M	
R3026	ERJ6GEYJ474V	MGF CHIP 1/10W 470K	
R3028	ERJ6GEYJ272V	MGF CHIP 1/10W 2.7K	
R3029	ERJ6GEYJ151V	MGF CHIP 1/10W 150	
R3032	ERJ6GEYJ122V	MGF CHIP 1/10W 1.2K	

Ref. No.	Part No.	Part Name & Description	Remarks
R3035	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R3036	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R3037	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R3038	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R3077	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R3084	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R3086	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R3091	ERJ6GEYJ750V	MGF CHIP 1/10W 75	
R3301	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R3302	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R3303	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R4001	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R4002	ERJ6GEYJ334V	MGF CHIP 1/10W 330K	
R4003	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R4004	ERJ6GEYJ333V	MGF CHIP 1/10W 33K	
R4005	ERJ6GEYJ225V	MGF CHIP 1/10W 2.2M	
R4006	ERJ6GEYJ681V	MGF CHIP 1/10W 680	
R4007	ERJ6GEYJ821V	MGF CHIP 1/10W 820	
R4008	ERJ6GEYJ273V	MGF CHIP 1/10W 27K	
R4009	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R4010	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R4011	ERJ6GEYJ682V	MGF CHIP 1/10W 6.8K	
R4012	ERJ6GEYJ682V	MGF CHIP 1/10W 6.8K	
R4014	ERJ6GEYJ472V	MGF CHIP 1/10W 4.7K	
R4015	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R4018	ERJ6GEYJ682V	MGF CHIP 1/10W 6.8K	
R4021	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R4101	ERJ6GEYJ563V	MGF CHIP 1/10W 56K	
R4102	ERJ6GEYJ154V	MGF CHIP 1/10W 150K	
R4103	ERJ6GEYJ273V	MGF CHIP 1/10W 27K	
R4172	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R4175	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R4502	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R4504	ERJ6GEYJ823V	MGF CHIP 1/10W 82K	
R4509	ERDS2TJ100T	CARBON 1/4W 10	
R4521	ERQ1ABJP4R7S	FUSE 1W 4.7	⚠
R4523	ERJ6GEY0R00V	MGF CHIP 1/10W 0	
R4591	ERDS2TJ681	CARBON 1/4W 680	
R4592	ERDS2TJ681	CARBON 1/4W 680	
R4593	ERDS2TJ681	CARBON 1/4W 680	
R4594	ERDS2TJ681	CARBON 1/4W 680	
R4701	ERJ6GEYJ561V	MGF CHIP 1/10W 560	
R5301	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R5304	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R5305	ERJ6GEYJ224V	MGF CHIP 1/10W 220K	
R5306	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R5308	ERJ6GEYJ563V	MGF CHIP 1/10W 56K	
R5309	ERJ6GEYJ274V	MGF CHIP 1/10W 270K	
R5311	ERJ6GEYJ331V	MGF CHIP 1/10W 330	
R5312	ERJ6GEYJ331V	MGF CHIP 1/10W 330	
R5313	ERJ6GEYJ331V	MGF CHIP 1/10W 330	
R5314	ERJ6GEYJ272V	MGF CHIP 1/10W 2.7K	
R5315	ERJ6GEYJ272V	MGF CHIP 1/10W 2.7K	
R5316	ERJ6GEYJ272V	MGF CHIP 1/10W 2.7K	

Ref. No.	Part No.	Part Name & Description	Remarks
R5317	ERDS2TJ101	CARBON 1/4W 100	
R5324	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R5401	ERJ6GEYJ561V	MGF CHIP 1/10W 560	
R5402	ERJ6GEYJ394V	MGF CHIP 1/10W 390K	
R5403	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R5405	ERJ6GEYJ822V	MGF CHIP 1/10W 8.2K	
R5406	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R5501	ERJ6GEYJ471V	MGF CHIP 1/10W 470	
R5502	ERJ6GEYJ394V	MGF CHIP 1/10W 390K	
R5503	ERDS2TJ471T	CARBON 1/4W 470	
R5504	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R5505	ERJ6ENF3241V	MGF CHIP 1/10W 3.24K	⚠
R5506	ERDS2TJ473T	CARBON 1/4W 47K	
R5508	ERJ6GEYJ561V	MGF CHIP 1/10W 560	
R5510	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R5511	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R5512	ERDS2TJ151T	CARBON 1/4W 150	
R5513	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R5601	ERJ6GEYJ272V	MGF CHIP 1/10W 2.7K	
R5604	ERJ6GEYJ332V	MGF CHIP 1/10W 3.3K	
R5611	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R5612	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R5614	ERJ6GEYJ563V	MGF CHIP 1/10W 56K	
R5902	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R5932	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R5933	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6001	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6002	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6003	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6004	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6005	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6007	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R6008	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6014	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6015	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6016	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6017	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6018	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6019	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R6021	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6022	ERJ6GEYJ332V	MGF CHIP 1/10W 3.3K	
R6023	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R6024	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6025	ERJ6GEY0R00V	MGF CHIP 1/10W 0	
R6026	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6028	ERJ6GEYJ472V	MGF CHIP 1/10W 4.7K	
R6029	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6030	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6032	ERJ6GEYJ122V	MGF CHIP 1/10W 1.2K	
R6035	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6040	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6041	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6042	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6044	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	

Ref. No.	Part No.	Part Name & Description	Remarks
R6045	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6046	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6049	ERJ6GEY0R00V	MGF CHIP 1/10W 0	
R6050	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6053	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R6054	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6055	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6057	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6058	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6059	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R6060	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6061	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6062	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6063	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6064	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6066	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6067	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6077	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6078	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6080	ERJ6GEYJ122V	MGF CHIP 1/10W 1.2K	
R6081	ERJ6GEYJ122V	MGF CHIP 1/10W 1.2K	
R6082	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6090	ERJ6GEYJ471V	MGF CHIP 1/10W 470	
R6091	ERJ6GEYJ471V	MGF CHIP 1/10W 470	
R6092	ERJ6GEYJ471V	MGF CHIP 1/10W 470	
R6098	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R6099	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R6100	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R6113	ERJ6GEYJ472V	MGF CHIP 1/10W 4.7K	
R6114	ERJ6GEYJ272V	MGF CHIP 1/10W 2.7K	
R6115	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6116	ERDS2TJ101	CARBON 1/4W 100	
R6118	ERJ6GEYJ104V	MGF CHIP 1/10W 100K	
R6119	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R6120	ERJ6GEYJ104V	MGF CHIP 1/10W 100K	
R6121	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R6122	ERJ6GEYJ181V	MGF CHIP 1/10W 180	
R6123	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R6124	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6126	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R6127	ERJ6GEYJ221V	MGF CHIP 1/10W 220	
R6130	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R6131	ERJ6GEYJ183V	MGF CHIP 1/10W 18K	
R6132	ERJ6GEYJ391V	MGF CHIP 1/10W 390	
R6133	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6134	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6135	ERJ6GEYJ475V	MGF CHIP 1/10W 4.7M	
R6136	ERJ6GEYJ332V	MGF CHIP 1/10W 3.3K	
R6137	ERJ6GEYJ182V	MGF CHIP 1/10W 1.8K	
R6138	ERDS2TJ560T	CARBON 1/4W 56	
R6142	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R6143	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R6144	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R6145	ERJ6GEYJ273V	MGF CHIP 1/10W 27K	

Ref. No.	Part No.	Part Name & Description	Remarks
R6146	ERJ6GEYJ273V	MGF CHIP 1/10W 27K	
R6149	ERJ6GEYJ273V	MGF CHIP 1/10W 27K	
R6150	ERJ6GEYJ912V	MGF CHIP 1/10W 9.1K	
R6160	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R6161	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R6162	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R6163	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R6164	ERJ6GEYJ472V	MGF CHIP 1/10W 4.7K	
R6165	ERJ6GEYJ472V	MGF CHIP 1/10W 4.7K	
R6166	ERJ6GEYJ223V	MGF CHIP 1/10W 22K	
R6170	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R6201	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6202	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R6203	ERJ6GEYJ274V	MGF CHIP 1/10W 270K	
R6204	ERJ6GEYJ184V	MGF CHIP 1/10W 180K	
R6205	ERJ6GEYJ103V	MGF CHIP 1/10W 10K	
R6207	ERJ6GEYJ101V	MGF CHIP 1/10W 100	
R6208	ERJ6GEYJ152V	MGF CHIP 1/10W 1.5K	
R6209	ERJ6GEYJ222V	MGF CHIP 1/10W 2.2K	
R6210	ERJ6GEYJ563V	MGF CHIP 1/10W 56K	
R6211	ERJ6GEYJ153V	MGF CHIP 1/10W 15K	
R6212	ERJ6GEYJ682V	MGF CHIP 1/10W 6.8K	
R6213	ERJ6GEYJ106V	MGF CHIP 1/10W 10M	
R6301	ERJ6GEYJ182V	MGF CHIP 1/10W 1.8K	
R6302	ERJ6GEYJ392V	MGF CHIP 1/10W 3.9K	
R6303	ERJ6GEYJ182V	MGF CHIP 1/10W 1.8K	
R6304	ERJ6GEYJ392V	MGF CHIP 1/10W 3.9K	
R6305	ERJ6GEYJ182V	MGF CHIP 1/10W 1.8K	
R6306	ERJ6GEYJ392V	MGF CHIP 1/10W 3.9K	
R6307	ERJ6GEYJ562V	MGF CHIP 1/10W 5.6K	
R6316	ERJ6GEY0R00V	MGF CHIP 1/10W 0	
R7001	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R7002	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R7003	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R7004	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	
R7006	ERJ6GEYJ271V	MGF CHIP 1/10W 270	
R7007	ERJ6GEYJ102V	MGF CHIP 1/10W 1K	

CAPACITORS

Ref. No.	Part No.	Part Name & Description	Remarks
C401	ECEA1HGE2R2B	ELECTROLYTIC 50V 2.2UF	
C402	ECA1CM471B	ELECTROLYTIC 16V 470	
C408	ECA1HGE010KB	ELECTROLYTIC 50V 1UF	
C409	ECA1VM101B	ELECTROLYTIC 35V 100	
C413	ECQB1H104KF3	POLYESTER 50V 0.1UF	
C414	ECA1EM102E	ELECTROLYTIC 25V 1000	
C418	ECA1VM221B	ELECTROLYTIC 35V 220UF	
C459	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C510	ECKR2H681KB5	CERAMIC 500V 680PF (A)	
C510	ECKR2H102KB5	CERAMIC 500V 1000PF (B)	
C513	ECA1HM470B	ELECTROLYTIC 50V 47UF	
C524	ECKC3D151KBP	CERAMIC 2KV 150PF (A)	⚠
C524	ECKW3D151KBP	CERAMIC 2KV 150PF (A)	⚠
C531	ECEA1HKA3R3	ELECTROLYTIC 50V 3.3UF	
C533	ECA1EM101B	ELECTROLYTIC 25V 100UF	
C534	ECEA1HKA2R2	ELECTROLYTIC 50V 2.2UF	
C552	ECA1EM221B	ELECTROLYTIC 25V 220	
C553	ECKR2H471KB5	CERAMIC 500V 470PF	
C554	ECWH12H622JS	POLYESTER 1.2KV 0.062UF (A)	⚠
C554	ECWH12H912JS	POLYESTER 1.2KV 0.091UF (B)	⚠
C556	ECWF2334JBB	POLYESTER 500V 0.33UF (A)	⚠
C556	ECWF2434JBB	POLYESTER 500V 0.43UF (B)	⚠
C558	ECA1VM221B	ELECTROLYTIC 35V 220UF (A)	
C558	ECA1VM331B	ELECTROLYTIC 35V 330UF (B)	
C560	ECA2EM100B	ELECTROLYTIC 250V 10UF	⚠
C561	ECA1HM2R2B	ELECTROLYTIC 50V 2.2UF	
C563	ECEA180V33WE	ELECTROLYTIC 180V 33UF	
C571	ECEA1HKA3R3	ELECTROLYTIC 50V 3.3UF (A)	
C571	ECEA1EKA100I	ELECTROLYTIC 25V 10UF (B)	
C572	ECA1CM221B	ELECTROLYTIC 16V 220UF	
C573	ECKR2H122KB5	CERAMIC 50V 0.0012UF (B)	
C801	VCKSRNG472ZX	CERAMIC 250V 4700PF	
C802	VCKSRNG472ZX	CERAMIC 250V 4700PF	
C803	VCKSRNG472ZX	CERAMIC 250V 4700PF	
C804	VCKSRNG472ZX	CERAMIC 250V 4700PF	
C805	ECES2DU221EG	ELECTROLYTIC 200V 220UF (A)	⚠
C805	EC0S2PP471BB	ELECTROLYTIC 180V 470UF (B)	⚠
C805	F2B2D2210009	ELECTROLYTIC 200V 220UF (A)	⚠
C805	ECES2PU471HG	ELECTROLYTIC 180V 470UF (B)	⚠
C806	ECA2EM100E	ELECTROLYTIC 250V 10UF (A)	
C806	ECA2EM220E	ELECTROLYTIC 250V 22UF (B)	
C807	J0LE00000023	ARRESTER	⚠
C808	ECQU2A823MLA	POLYESTER 250V 0.082UF	⚠
C808	LSCFQ2A823MC	POLYESTER 250V 0.082UF	⚠
C809	F1B2E101A009	CERAMIC 250V 100PF	⚠
C809	F1B2E101A008	CERAMIC 250V 100PF	⚠
C809	F1B2E101A032	CERAMIC 250V 100PF	⚠
C809	F1B2E101A033	CERAMIC 250V 100PF	⚠
C811	F1B2E152A012	CERAMIC 250V 1500PF	⚠
C811	F1B2E152A011	CERAMIC 250V 1500PF	⚠
C811	F1B2E152A044	CERAMIC 250V 1500PF	⚠

Ref. No.	Part No.	Part Name & Description	Remarks
C811	F1B2E152A045	CERAMIC 250V 1500PF	⚠
C811	F1B2E1520002	CERAMIC 250V 1500PF	⚠
C811	F1B2E1520006	CERAMIC 250V 1500PF	⚠
C1001	ECKATS103MF	CERAMIC 250V 0.01UF	⚠
C1001	ECKETS103MF	CERAMIC 125V 0.01UF	⚠
C1001	VCKST3G103MY	CERAMIC 250V 0.01UF	⚠
C1001	VCKSU3D103MY	CERAMIC 125V 0.01UF	⚠
C1002	ECKATS332ME8	CERAMIC 250V 3300PF	⚠
C1002	ECKDNB332ME8	CERAMIC 125V 3300PF	⚠
C1002	ECKETS332ME8	CERAMIC 125V 3300PF	⚠
C1002	VCKST3G332MX	CERAMIC 250V 3300PF	⚠
C1002	VCKSU3D332MX	CERAMIC 125V 3300PF	⚠
C1003	F1B2E102A012	CERAMIC 250V 1000PF	⚠
C1003	F1B2E102A011	CERAMIC 250V 1000PF	⚠
C1003	F1B2E102A044	CERAMIC 250V 1000PF	⚠
C1003	F1B2E102A045	CERAMIC 250V 1000PF	⚠
C1003	F1B2E1020005	CERAMIC 250V 1000PF	⚠
C1003	F1B2E1020006	CERAMIC 250V 1000PF	⚠
C1004	ECEA2DU121YE	ELECTROLYTIC 200V 120UF	⚠
C1004	F2A2D1210001	ELECTROLYTIC 200V 120UF	⚠
C1004	F2A2D1210003	ELECTROLYTIC 200V 120UF	⚠
C1004	VCESR2D121XE	ELECTROLYTIC 200V 120UF	⚠
C1005	ECA2DHG4R7B	ELECTROLYTIC 200V 4.7UF	
C1006	ECKR2H221KB5	CERAMIC 500V 220PF	
C1007	ECJ2VB1C224K	C CHIP 16V 0.22UF	
C1009	VCYSBRE183KX	CERAMIC 25V 0.018UF	
C1010	ECJ2VB1H102K	C CHIP 50V 1000PF	
C1011	ECA1HHG470B	ELECTROLYTIC 50V 47UF	
C1012	ECEA1PEE331	ELECTROLYTIC 18V 330UF	
C1013	ECA1EM331B	ELECTROLYTIC 25V 330UF	
C1016	ECEA1PEE331	ELECTROLYTIC 18V 330UF	
C1017	ECA0JM102B	ELECTROLYTIC 6.3V 1000UF	
C1018	ECJ2VB1E104K	C CHIP 25V 0.1UF	
C1025	F1B2E101A009	CERAMIC 250V 100PF	⚠
C1025	F1B2E101A008	CERAMIC 250V 100PF	⚠
C1025	F1B2E101A032	CERAMIC 250V 100PF	⚠
C1025	F1B2E101A033	CERAMIC 250V 100PF	⚠
C1029	ECJ2VC1H101J	C CHIP 50V 100PF	
C1030	VCYSBRE183KX	CERAMIC 25V 0.018UF	
C1051	ECEA1HKAR47	ELECTROLYTIC 50V 0.47UF	
C1052	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C1058	ECEA0JEE101	ELECTROLYTIC 6.3V 100UF	
C1059	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C1060	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C3003	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3004	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3006	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3007	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C3008	ECJ2VC1H181J	C CHIP 50V 180PF	
C3009	ECEA1EKA4R7	ELECTROLYTIC 25V 4.7UF	

Ref. No.	Part No.	Part Name & Description	Remarks
C3010	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3013	ECJ2VF1C224Z	C CHIP 16V 0.22UF	
C3015	ECEA0JKA470	ELECTROLYTIC 6.3V 47UF	
C3016	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C3019	ECEA1HKA2R2	ELECTROLYTIC 50V 2.2UF	
C3020	ECEA1CKA220	ELECTROLYTIC 16V 22UF	
C3021	ECEA1HKA2R2	ELECTROLYTIC 50V 2.2UF	
C3022	ECJ2VF1C224Z	C CHIP 16V 0.22UF	
C3023	ECJ2VC1H680J	C CHIP 50V 68PF	
C3024	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3025	ECJ2VB1E104K	C CHIP 25V 0.1UF	
C3026	ECJ2VB1H822K	C CHIP 50V 8200PF	
C3027	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3030	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3031	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3032	ECJ2VF1C474Z	C CHIP 16V 0.47UF	
C3034	ECJ2VC1H181J	C CHIP 50V 180PF	
C3035	ECJ2VC1H330J	C CHIP 50V 33PF	
C3036	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3038	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C3041	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3043	ECJ2VB1H392K	C CHIP 50V 3900PF	
C3044	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3045	ECEA1HKAR47	ELECTROLYTIC 50V 0.47UF	
C3046	ECEA1HKA2R2	ELECTROLYTIC 50V 2.2UF	
C3047	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C3048	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3050	ECEA1HKA2R2	ELECTROLYTIC 50V 2.2UF	
C3053	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3055	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3056	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3057	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3058	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3082	ECJ2VB1H332K	C CHIP 50V 3300PF	
C3231	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C3232	ECJ2VB1H102K	C CHIP 50V 1000PF	
C3234	ECEA0JKA470	ELECTROLYTIC 6.3V 47UF	
C3235	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3236	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3237	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C4001	ECJ2VF1C224Z	C CHIP 16V 0.22UF	
C4002	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C4003	ECJ2VB1H272K	C CHIP 50V 2700PF	
C4004	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C4005	ECEA0JKA220	ELECTROLYTIC 6.3V 22UF	
C4006	ECJ2VB1H102K	C CHIP 50V 1000PF	
C4007	ECEA0JKA220	ELECTROLYTIC 6.3V 22UF	
C4008	ECEA0JKA470	ELECTROLYTIC 6.3V 47UF	
C4009	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C4010	ECJ2VB1E333K	C CHIP 25V 0.033UF	
C4011	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C4012	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C4013	ECEA0JKA470	ELECTROLYTIC 6.3V 47UF	
C4014	ECEA1HKA010	ELECTROLYTIC 50V 1UF	

Ref. No.	Part No.	Part Name & Description	Remarks
C4018	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C4020	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C4102	ECQB1562JF	POLYESTER 100V 5600PF	
C4103	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C4104	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C4105	ECEA1CKA220	ELECTROLYTIC 16V 22UF	
C4171	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C4502	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C4504	ECEA1EKA4R7	ELECTROLYTIC 25V 4.7UF	
C4506	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C4508	ECA1CM221B	ELECTROLYTIC 16V 220UF	
C4509	ECJ2VB1E473K	C CHIP 25V 0.047UF	
C4521	ECA1EM102B	ELECTROLYTIC 25V 1000UF	
C4524	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C5301	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C5302	ECEA1EKA4R7	ELECTROLYTIC 25V 4.7UF	
C5303	ECEA1HKAR47	ELECTROLYTIC 50V 0.47UF	
C5305	ECEA1HKAR33I	ELECTROLYTIC 50V 0.33UF	
C5306	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C5307	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C5308	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C5401	VCUSTBC224KB	C CHIP 16V 0.22UF	
C5402	ECJ2VB1H222K	C CHIP 50V 0.0022UF	
C5403	ECEA1HKA2R2	ELECTROLYTIC 50V 2.2UF	
C5501	ECJ2VB1E183K	C CHIP 25V 0.018UF	
C5502	ECJ2VB1H681K	C CHIP 50V 680PF	
C5505	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C5506	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C5507	ECEA1CKA100	ELECTROLYTIC 16V 10UF	
C5508	ECUV1H221JSN	C CHIP 50V 220PF	
C5510	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C5511	ECJ2VB1E333K	C CHIP 25V 0.033UF	
C5516	ECJ2VB1E333K	C CHIP 25V 0.033UF	
C5601	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C5602	ECJ2VB1E104K	C CHIP 25V 0.1UF	
C5603	ECJ2VC1H150J	C CHIP 50V 15PF	
C5604	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C5605	ECJ2VB1E153K	C CHIP 25V 0.015UF	
C5902	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C5903	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C5904	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C5905	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C5906	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C5932	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C6001	ECEA0JKA331B	ELECTROLYTIC 6.3V 330UF	
C6002	ECJ2VC1H080C	C CHIP 50V 8PF	
C6003	ECJ2VC1H100C	C CHIP 50V 10PF	
C6004	ECJ2VB1E104K	C CHIP 25V 0.1UF	
C6006	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C6009	ECEA1CKS100	ELECTROLYTIC 16V 10UF	
C6013	ECJ2VC1H101J	C CHIP 50V 100PF	
C6017	ECJ2VC1H101J	C CHIP 50V 100PF	
C6018	ECJ2VC1H101J	C CHIP 50V 100PF	
C6020	ECJ2VF1H104Z	C CHIP 50V 0.1UF	

Ref. No.	Part No.	Part Name & Description	Remarks
C6021	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C6023	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C6025	ECEA0JKA470	ELECTROLYTIC 6.3V 47UF	
C6029	ECJ2VF1H104Z	C CHIP 50V 0.1UF	
C6040	ECJ2VB1H102K	C CHIP 50V 1000PF	
C6041	ECJ2VB1H102K	C CHIP 50V 1000PF	
C6044	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C6201	ECKR1H102KB5	CERAMIC 50V 1000PF	
C6202	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C6203	ECJ2VB1H332K	C CHIP 50V 3300PF	
C6204	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C6207	ECJ2VF1H104Z	C CHIP 50V 0.1UF	
C6208	ECEA1CKS100	ELECTROLYTIC 16V 10UF	
C6209	ECJ2VB1H102K	C CHIP 50V 1000PF	
C6212	ECJ2VF1H104Z	C CHIP 50V 0.1UF	
C6213	ECEA0JKS331I	ELECTROLYTIC 6.3V 330UF	
C6214	ECEA0JKS220I	ELECTROLYTIC 6.3V 22UF	
C6215	ECJ2VB1H272K	C CHIP 50V 2700PF	
C6216	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C6220	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C6221	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C6302	ECJ2VF1H104Z	C CHIP 50V 0.1UF	
C6401	ECJ2VF1H104Z	C CHIP 50V 0.1UF	
C6402	ECEA0JKA101	ELECTROLYTIC 6.3V 100UF	
C6403	ECEA1HKA010	ELECTROLYTIC 50V 1UF	
C6404	ECJ2VC1H121J	C CHIP 50V 120PF	
C6406	ECEA1HKS010I	ELECTROLYTIC 50V 1UF	
C6408	ECJ2VB1H222K	C CHIP 50V 0.0022UF	
C6410	ECJ2VB1H103K	C CHIP 50V 0.01UF	
C7002	ECJ2VB1H102K	C CHIP 50V 1000PF	
C7006	ECA0JM102B	ELECTROLYTIC 6.3V 1000UF	
C7007	ECJ2VB1H102K	C CHIP 50V 1000PF	
C7008	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C7010	ECEA1HKA010	ELECTROLYTIC 50V 1UF	

COILS

Ref. No.	Part No.	Part Name & Description	Remarks
L501	G0D680000001	COIL (B)	⚠
L501	ELH5L4108	COIL (B)	⚠
L501	G0D510000001	COIL (B)	⚠
L553	VLQSW07D220M	COIL 22UH	
L803	ELF21V018A	LINE NOISE FILTER	⚠
L803	LLN63055A	COIL	⚠
L1001	ELF15N005A	COIL LINE FILTER 0.5A 18M	⚠
L1001	ELF18D290A	COIL LINE FILTER 0.5A 18M	⚠
L1001	J0HBLD000001	LINE FILTER 18MH 0.5A	⚠
L1001	J0HBLD000002	LINE FILTER 0.5AS 18MH	⚠
L1002	VLQSAB7D220K	COIL 22UH	
L1003	VLQSAB7D100K	COIL 10UH	
L1006	J0JHB0000021	FILTER	
L1007	G0C101KA0045	COIL 100UH	
L3001	G0C390KA0045	COIL 39UH	
L3002	ELESN101KA	COIL 100UH	
L3005	G0C330KA0045	COIL 33UH	
L3010	ELESN470KA	COIL 47UH	
L3231	ELESN221KA	COIL 220UH	
L4001	ELELN153KA	COIL 15MH	
L4002	ELESN101KA	COIL 100UH	
L4004	G0C390KA0045	COIL 39UH (A)	
L4004	G0C220KA0045	COIL 22UH (B)	
L4101	ELESN471KA	COIL 470UH	
L5901	ELESN101KA	COIL 100UH	
L5902	ELESN470KA	COIL 47UH	
L6201	ELEXT101KE04	COIL 100UH	
L6401	ELEXT101KE04	COIL 100UH	
L6402	J0JBC0000022	CHIP BEAD INDUCTOR	
L6403	J0JBC0000022	CHIP BEAD INDUCTOR	
L6404	J0JBC0000022	CHIP BEAD INDUCTOR	
L6405	J0JBC0000022	CHIP BEAD INDUCTOR	
L7002	ELESN100KA	COIL 10UH	

CRYSTAL OSCILLATOR

Ref. No.	Part No.	Part Name & Description	Remarks
X5501	H2A503300012	CRYSTAL OSCILLATOR	
X5601	VSXS0190-TB	CRYSTAL OSCILLATOR	
X6001	VSXS0784	CRYSTAL OSCILLATOR	

PIN HEADERS

Ref. No.	Part No.	Part Name & Description	Remarks
P552	LSJWS4N250LL	PIN HEADER (A)	
P552	LSJWS4N360LL	PIN HEADER (B)	
P801	VEKS5809	CONNECTOR CABLE W/OUT PLUG 200V	
P803	LSJP0814	CONNECTOR 2P	
P3001	K1KA12A00232	CONNECTOR 12P	
P4001	VJSS0888	CONNECTOR 2P	
P4002	LSJWR6N120CL	PARALLEL WIRE	
P4591	K1KA02A00375	CONNECTOR 2P	
P5301	LSJWR4N380LL	CONNECTOR CABLE W/PLUG,12V DC (A)	
P5301	LSJWR4N490LL	CONNECTOR CABLE W/OUT PLUG,12V DC (B)	
P6001	K1KA05A00268	CONNECTOR 5P	
P6201	K1KA12A00234	CONNECTOR 12P	

SWITCHES

Ref. No.	Part No.	Part Name & Description	Remarks
SW6001	LSSH0002	SWITCH LEAF SWITCH-SAFETY T	
SW6002	K0N107C00002	SWITCH PUSH	
SW6301	K0H1BA000259	SWITCH PUSH (A)	
SW6301	EVQ21405R	SWITCH PUSH (B)	
SW6302	K0H1BA000259	SWITCH PUSH (A)	
SW6302	EVQ21405R	SWITCH PUSH (B)	
SW6303	K0H1BA000259	SWITCH PUSH (A)	
SW6303	EVQ21405R	SWITCH PUSH (B)	
SW6304	K0H1BA000259	SWITCH PUSH (A)	
SW6304	EVQ21405R	SWITCH PUSH (B)	
SW6305	K0H1BA000259	SWITCH PUSH (A)	
SW6305	EVQ21405R	SWITCH PUSH (B)	
SW6306	K0H1BA000259	SWITCH PUSH (A)	
SW6306	EVQ21405R	SWITCH PUSH (B)	
SW6307	K0H1BA000259	SWITCH PUSH (A)	
SW6307	EVQ21405R	SWITCH PUSH (B)	
SW6308	K0H1BA000259	SWITCH PUSH (A)	
SW6308	EVQ21405R	SWITCH PUSH (B)	
SW6309	K0H1BA000259	SWITCH PUSH (A)	
SW6309	EVQ21405R	SWITCH PUSH (B)	
SW6310	K0H1BA000259	SWITCH PUSH (A)	
SW6310	EVQ21405R	SWITCH PUSH (B)	
SW6311	K0H1BA000259	SWITCH PUSH (A)	
SW6311	EVQ21405R	SWITCH PUSH (B)	

FUSE & PROTECTOR

Ref. No.	Part No.	Part Name & Description	Remarks
F801	K5D402AQ0002	FUSE 125V 4A	⚠
F801	K5D402AB0002	FUSE 125V 4A	⚠
F801	K5D402ADA002	FUSE 125V 4A	⚠
F801	K5D402ADA006	FUSE 125V 4A	⚠
F1001	K5D162AQ0004	FUSE 125V 1.6A	⚠
F1001	K5D162ADA001	FUSE 125V 1.6A	⚠
F1001	K5D162ADA008	FUSE 125V 1.6A	⚠
PR1001	UNH000600A	IC PROTECTOR 1.5A	⚠
PR1001	B1ZAZ0000040	IC PROTECTOR 1.5A	⚠
PR1001	LSSF009A25E	IC PROTECTOR 1.5A	⚠
PR1002	UNH000600A	IC PROTECTOR 1.5A	⚠
PR1002	B1ZAZ0000040	IC PROTECTOR 1.5A	⚠
PR1002	LSSF009A25E	IC PROTECTOR 1.5A	⚠

RELAY

Ref. No.	Part No.	Part Name & Description	Remarks
RL801	LSSY0004	RELAY	⚠
RL801	K6B1AGA00034	RELAY	⚠
RL801	K6B1AGA00042	RELAY	⚠
RL801	TSEH0013	RELAY	⚠
RL801	TSEH1860-1	RELAY	⚠

TRANSFORMER

Ref. No.	Part No.	Part Name & Description	Remarks
T501	ETH09K6AZ	TRANSFORMER (A)	
T501	ETH09K8AZ	TRANSFORMER (B)	
T551	G4G3H0000001	FLYBACK TRANSFORMER (A)	⚠
T551	KFT3AB400FU	FLYBACK TRANSFORMER (B)	⚠
T1001	ETS28AD2J3AC	SW TRANSFORMER	⚠
T1001	LSTP0105-2	TRANSFORMER	⚠
T1001	VTPS0042	SW TRANSFORMER	⚠
T4101	G2A342C00003	TRANSFORMER	

JACKS

Ref. No.	Part No.	Part Name & Description	Remarks
JK4591	K2HC103B0130	JACK	
JK4701	K2HA204B0114	JACK	

MISCELLANEOUS

Ref. No.	Part No.	Part Name & Description	Remarks
244	TUX77809	CLAMPER (A)	
458	XTV3+8J	TAPPING SCREW,STEEL (A)	
483	XYN3+F10S	SCREW W/WASHER,STEEL	
488	XYN3+F6S	SCREW W/WASHER,STEEL	
497	XTV3+10J	TAPPING SCREW,STEEL	
711	PNA4611M00HC	INFRARED RECEIVER UNIT	
714	VMTS0059	CUSHION,RUBBER	
719	VMFS0136	CUSHION (B)	
743	ENG36706GY	TUNER,UHF/VHF NR (B)	
751	LML69001A	ANODE LEAD CLAMPER	
758	TUC77616	GROUNDING PLATE,AL (A)	
766	TUC76677-1	HEAT SINK PLATE,STEEL (A)	
767	TUC77626	HEAT SINK PLATE,STEEL (B)	
768	TUC77603-1	GROUNDING PLATE,AL (B)	
769	LUS23005B	HEAT SINK PLATE (B)	
771	EYF52BC	FUSE HOLDER	

12.3.2. HEAD AMP C.B.A.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

INTEGRATED CIRCUITS

Ref. No.	Part No.	Part Name & Description	Remarks
IC3501	AN3361SB	IC, LINEAR	

RESISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
R3501	ERJ6GEYJ473V	MGF CHIP 1/10W 47K	
R3502	ERJ6GEYJ560V	MGF CHIP 1/10W 56	
R3503	ERJ6GEYJ560V	MGF CHIP 1/10W 56	
R3504	ERJ6GEYJ560V	MGF CHIP 1/10W 56	
R3505	ERJ6GEYJ560V	MGF CHIP 1/10W 56	
R3506	ERJ6GEYJ561V	MGF CHIP 1/10W 560	
R3507	ERJ6GEYJ561V	MGF CHIP 1/10W 560	

CAPACITORS

Ref. No.	Part No.	Part Name & Description	Remarks
C3504	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3505	ECEA1CKA470	ELECTROLYTIC 16V 47UF	
C3506	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3507	ECJ2VB1H102K	C CHIP 50V 1000PF	
C3508	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3511	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3512	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3513	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3519	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3520	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3523	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3524	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3528	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3529	ECJ2VF1H103Z	C CHIP 50V 0.01UF	
C3532	ECJ2VF1E104Z	C CHIP 25V 0.1UF	
C3533	ECJ2VF1H103Z	C CHIP 50V 0.01UF	

COILS

Ref. No.	Part No.	Part Name & Description	Remarks
L3501	G0C101KA0045	COIL 100UH	

PIN HEADERS

Ref. No.	Part No.	Part Name & Description	Remarks
P3501	K1KB12B00044	CONNECTOR 12P	

12.3.3. CRT C.B.A.

(Model: A)

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

TRANSISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
Q351	2SC14730Q	TRANSISTOR SI NPN	
Q351	B1AACN000014	TRANSISTOR SI NPN	
Q351	B1BAAN000029	TRANSISTOR SI NPN	
Q351	2SC1473A-Q	TRANSISTOR SI NPN	
Q352	2SC14730Q	TRANSISTOR SI NPN	
Q352	B1AACN000014	TRANSISTOR SI NPN	
Q352	B1BAAN000029	TRANSISTOR SI NPN	
Q352	2SC1473A-Q	TRANSISTOR SI NPN	
Q353	2SC14730Q	TRANSISTOR SI NPN	
Q353	B1AACN000014	TRANSISTOR SI NPN	
Q353	B1BAAN000029	TRANSISTOR SI NPN	
Q353	2SC1473A-Q	TRANSISTOR SI NPN	

DIODES

Ref. No.	Part No.	Part Name & Description	Remarks
D351	MAZ41500MF	DIODE ZENER 15V	
D351	B0BA01400041	DIODE ZENER VOLTAGE REGULATION D	

RESISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
R351	ERG1ANJ153H	METAL OXIDE 1W 15K	⚠
R351	ERG1ANJP153H	METAL OXIDE 1W 15K	⚠
R351	ERG2SJ153H	METAL OXIDE 2W 15K	⚠
R351	KRG1ANJP153H	METAL OXIDE 1W 15K	⚠
R352	ERG1ANJ153H	METAL OXIDE 1W 15K	⚠
R352	ERG1ANJP153H	METAL OXIDE 1W 15K	⚠
R352	ERG2SJ153H	METAL OXIDE 2W 15K	⚠
R352	KRG1ANJP153H	METAL OXIDE 1W 15K	⚠
R353	ERG1ANJ153H	METAL OXIDE 1W 15K	⚠
R353	ERG1ANJP153H	METAL OXIDE 1W 15K	⚠
R353	ERG2SJ153H	METAL OXIDE 2W 15K	⚠
R353	KRG1ANJP153H	METAL OXIDE 1W 15K	⚠
R354	ERD25TJ272T	CARBON 1/4W 2.7K	
R356	ERD25TJ272T	CARBON 1/4W 2.7K	
R357	ERDS2TJ392	CARBON 1/4W 3.9K	
R358	ERDS2TJ392	CARBON 1/4W 3.9K	
R359	ERDS2TJ392	CARBON 1/4W 3.9K	
R360	ERDS2TJ391T	CARBON 1/4W 390	
R361	ERDS2TJ391T	CARBON 1/4W 390	
R362	ERDS2TJ391T	CARBON 1/4W 390	
R363	ERDS2TJ181T	CARBON 1/4W 180	
R364	ERDS2TJ181T	CARBON 1/4W 180	
R365	ERDS2TJ181T	CARBON 1/4W 180	
R366	ERD25TJ272T	CARBON 1/4W 2.7K	

CAPACITORS

Ref. No.	Part No.	Part Name & Description	Remarks
C351	F1D1H391A012	CERAMIC 50V 390PF	
C352	F1D1H391A012	CERAMIC 50V 390PF	
C353	F1D1H471A012	CERAMIC 50V 470PF	
C354	F1B3D1020008	CERAMIC 2KV 1000PF	

PIN HEADERS

Ref. No.	Part No.	Part Name & Description	Remarks
P355	K3B09BA00006	CRT SOCKET	⚠

MISCELLANEOUS

Ref. No.	Part No.	Part Name & Description	Remarks
153	TMM7443-1	CLAMPER	

12.3.4. CRT C.B.A.

(Model: B)

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
AG-513F	A
AG-520F	B

TRANSISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
Q351	2SC3063	TRANSISTOR SI NPN	
Q351	2SC3271F-N	TRANSISTOR SI NPN	
Q351	2SC3619	TRANSISTOR SI NPN	
Q352	2SC3063	TRANSISTOR SI NPN	
Q352	2SC3271F-N	TRANSISTOR SI NPN	
Q352	2SC3619	TRANSISTOR SI NPN	
Q353	2SC3063	TRANSISTOR SI NPN	
Q353	2SC3271F-N	TRANSISTOR SI NPN	
Q353	2SC3619	TRANSISTOR SI NPN	

DIODES

Ref. No.	Part No.	Part Name & Description	Remarks
D351	MAZ41500MF	DIODE ZENER 15V	
D351	B0BA01400041	DIODE ZENER VOLTAGE REGULATION D	

RESISTORS

Ref. No.	Part No.	Part Name & Description	Remarks
R351	ERG2ANJ153H	METAL OXIDE 2W 15K	⚠
R352	ERG2ANJ153H	METAL OXIDE 2W 15K	⚠
R353	ERG2ANJ153H	METAL OXIDE 2W 15K	⚠
R354	ERD25TJ272T	CARBON 1/4W 2.7K	
R355	ERD25TJ272T	CARBON 1/4W 2.7K	
R356	ERD25TJ272T	CARBON 1/4W 2.7K	
R357	ERDS2TJ392	CARBON 1/4W 3.9K	
R358	ERDS2TJ392	CARBON 1/4W 3.9K	
R359	ERDS2TJ392	CARBON 1/4W 3.9K	
R360	ERDS2TJ391T	CARBON 1/4W 390	
R361	ERDS2TJ391T	CARBON 1/4W 390	
R362	ERDS2TJ391T	CARBON 1/4W 390	
R363	ERDS2TJ121T	CARBON 1/4W 120	
R364	ERDS2TJ121T	CARBON 1/4W 120	
R365	ERDS2TJ121T	CARBON 1/4W 120	

CAPACITORS

Ref. No.	Part No.	Part Name & Description	Remarks
C351	F1D1H471A012	CERAMIC 50V 470PF	
C352	F1D1H471A012	CERAMIC 50V 470PF	
C353	F1D1H561A012	CERAMIC 50V 560PF	
C354	F1B3D1020008	CERAMIC 2KV 1000PF	

PIN HEADERS

Ref. No.	Part No.	Part Name & Description	Remarks
P353	K3B10AA00001	CRT SOCKETS	⚠

MISCELLANEOUS

Ref. No.	Part No.	Part Name & Description	Remarks
153	TMM7443-1	CLAMPER	⚠

13. SCHEMATIC DIAGRAMS FOR PRINTING WITH LETTER SIZE

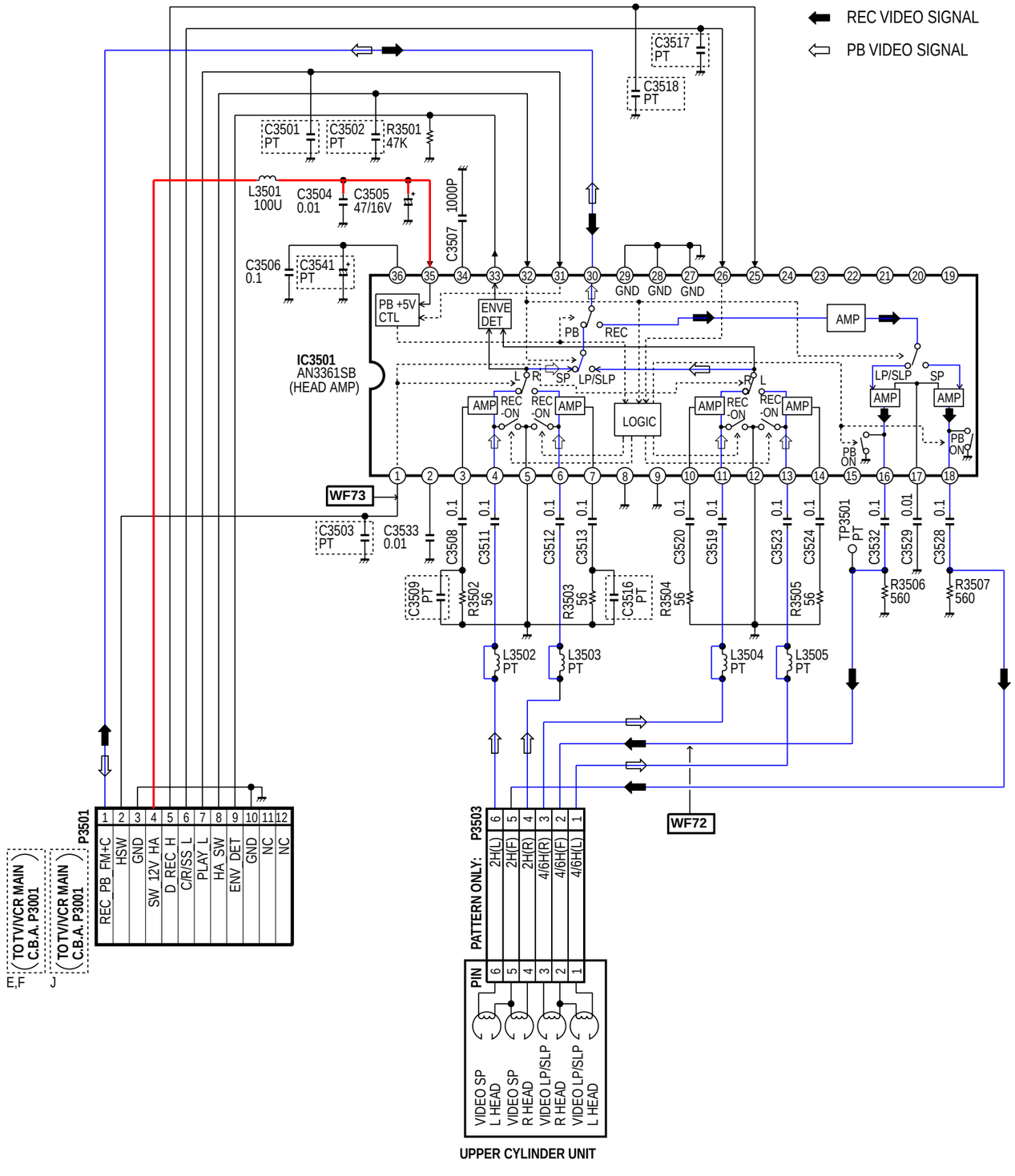
HEAD AMP SCHEMATIC DIAGRAM

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts,
be sure to use the part number listed in the parts list.
Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
--------	A
--------	B
--------	C
--------	D
AG-513F	E
--------	F
AG-520F	G
--------	H
--------	I
--------	J
--------	K
Not Used	PT



LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2009
AG-513F/AG-520F
HEAD AMP SCHEMATIC DIAGRAM

CRT SCHEMATIC DIAGRAM (E)

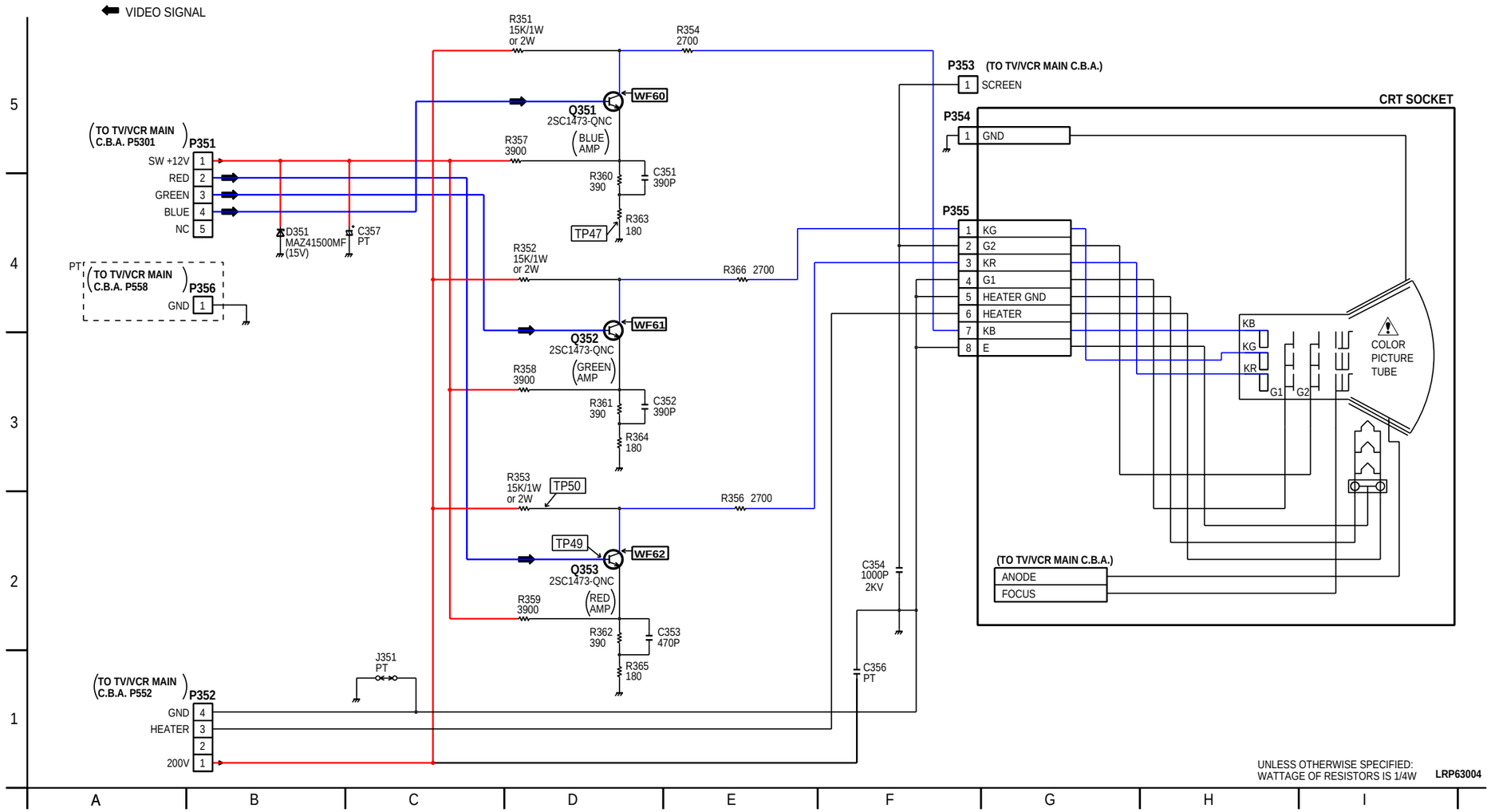
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

AG-513F

CRT SCHEMATIC DIAGRAM

CRT SCHEMATIC DIAGRAM (G)

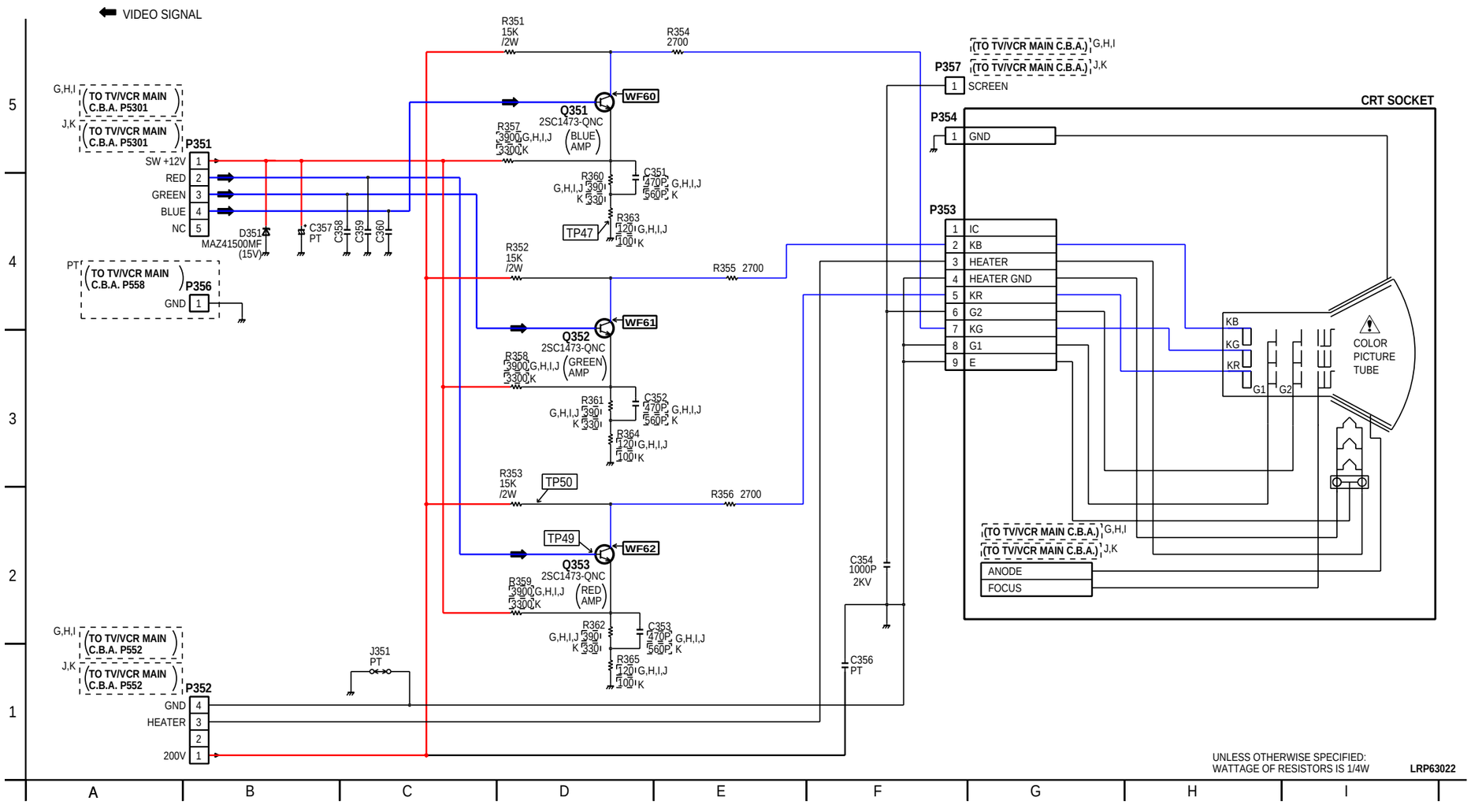
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



LINK TO VOLTAGE CHART
LINK TO SIGNAL WAVEFORM

AG-520F
CRT SCHEMATIC DIAGRAM

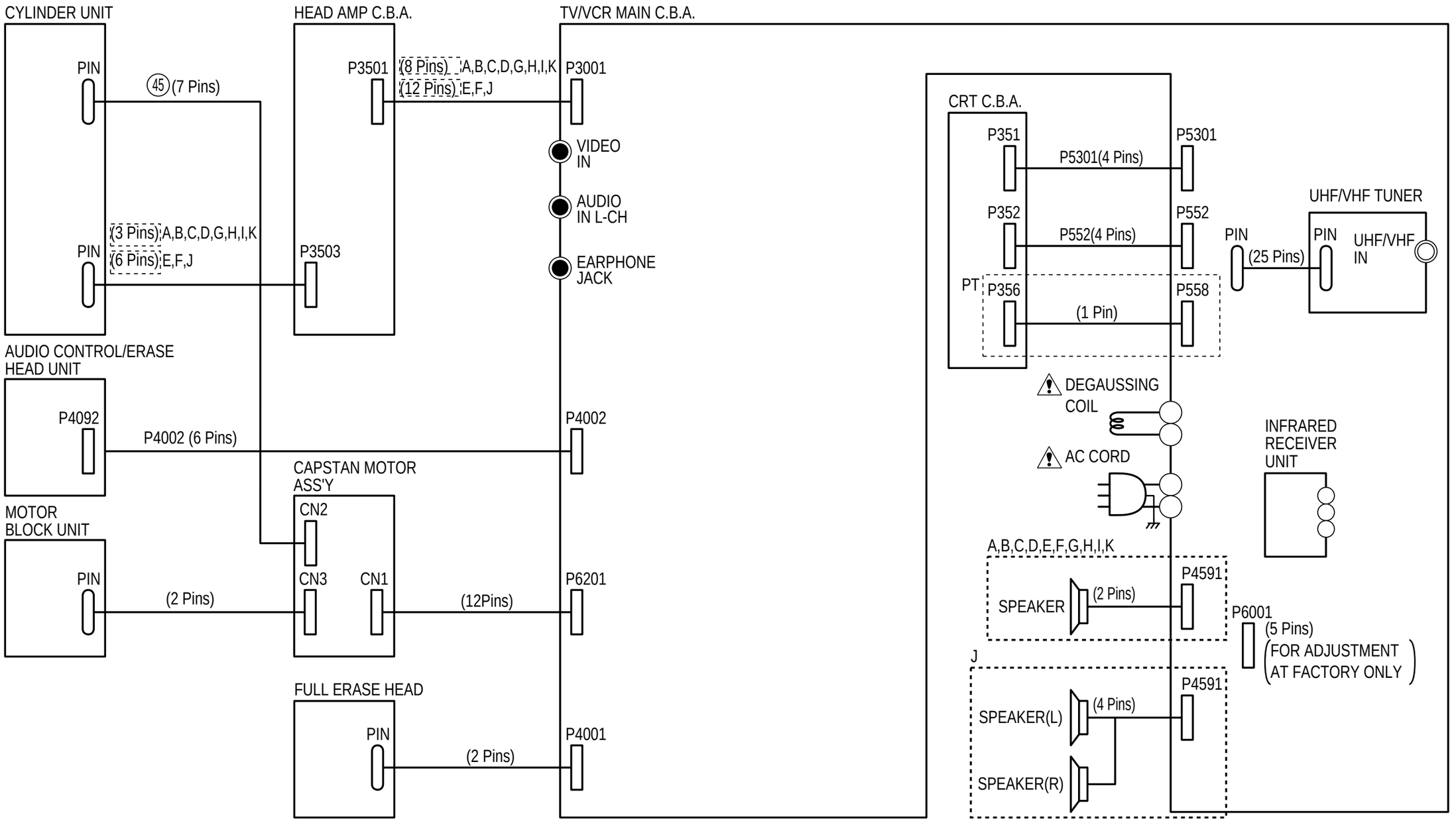
INTERCONNECTION SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

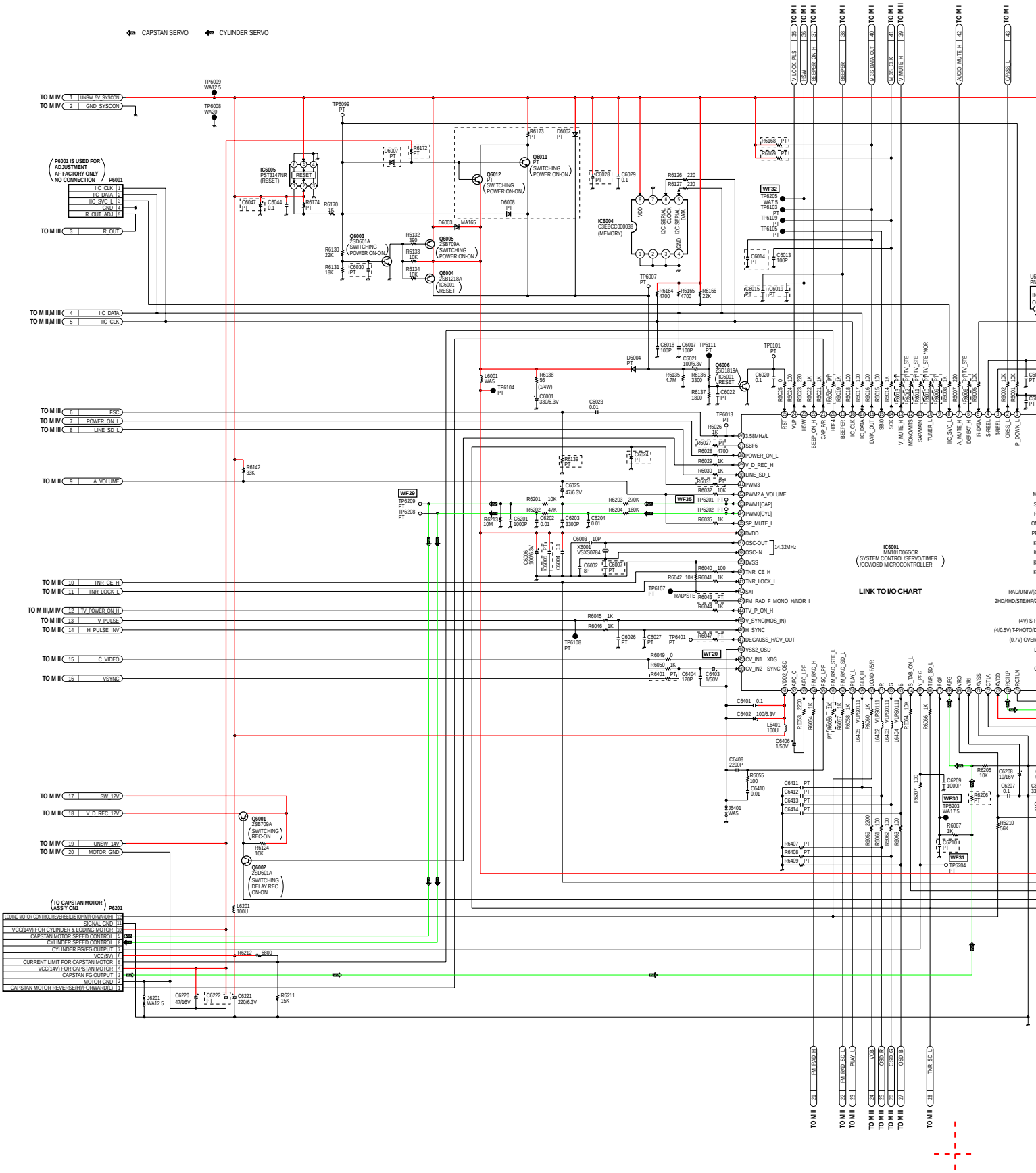
COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
--------	A
--------	B
--------	C
--------	D
AG-513F	E
--------	F
AG-520F	G
--------	H
--------	I
--------	J
--------	K
Not Used	PT



8.2. TV/VCR MAIN SCHEMATIC DIAGRAM

TV/VCR MAIN I (SYSTEM CONTROL/SERVO/CCV/OSD/OPERATION) SCHEMATIC DIAGRAM



RAM

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

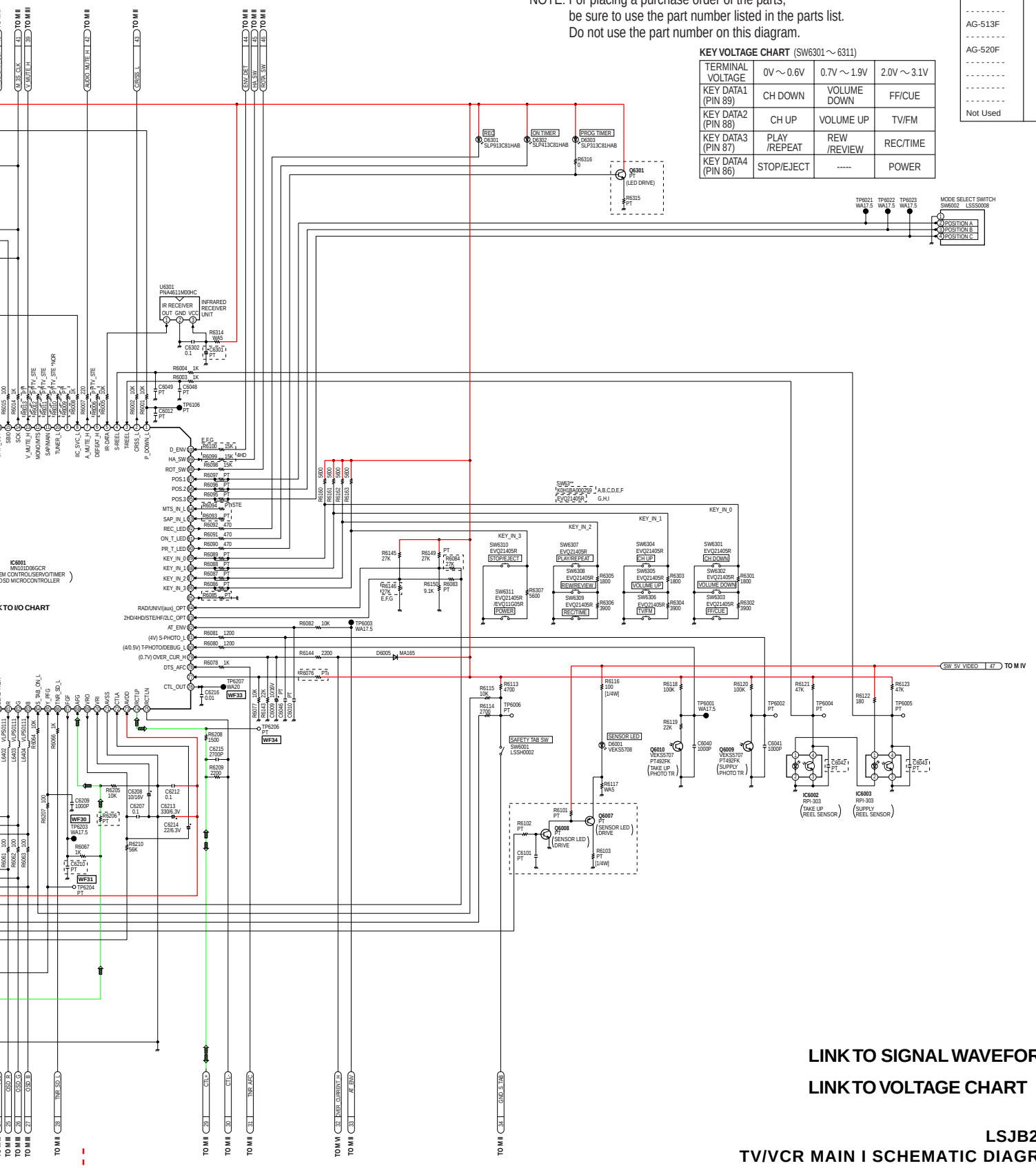
NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT

KEY VOLTAGE CHART (SW6301～6311)

TERMINAL VOLTAGE	0V～0.6V	0.7V～1.9V	2.0V～3.1V
KEY DATA1 (PIN 89)	CH DOWN	VOLUME DOWN	FF/CUE
KEY DATA2 (PIN 88)	CH UP	VOLUME UP	TV/FM
KEY DATA3 (PIN 87)	PLAY /REPEAT	REW /REVIEW	REC/TIME
KEY DATA4 (PIN 86)	STOP/EJECT	-----	POWER

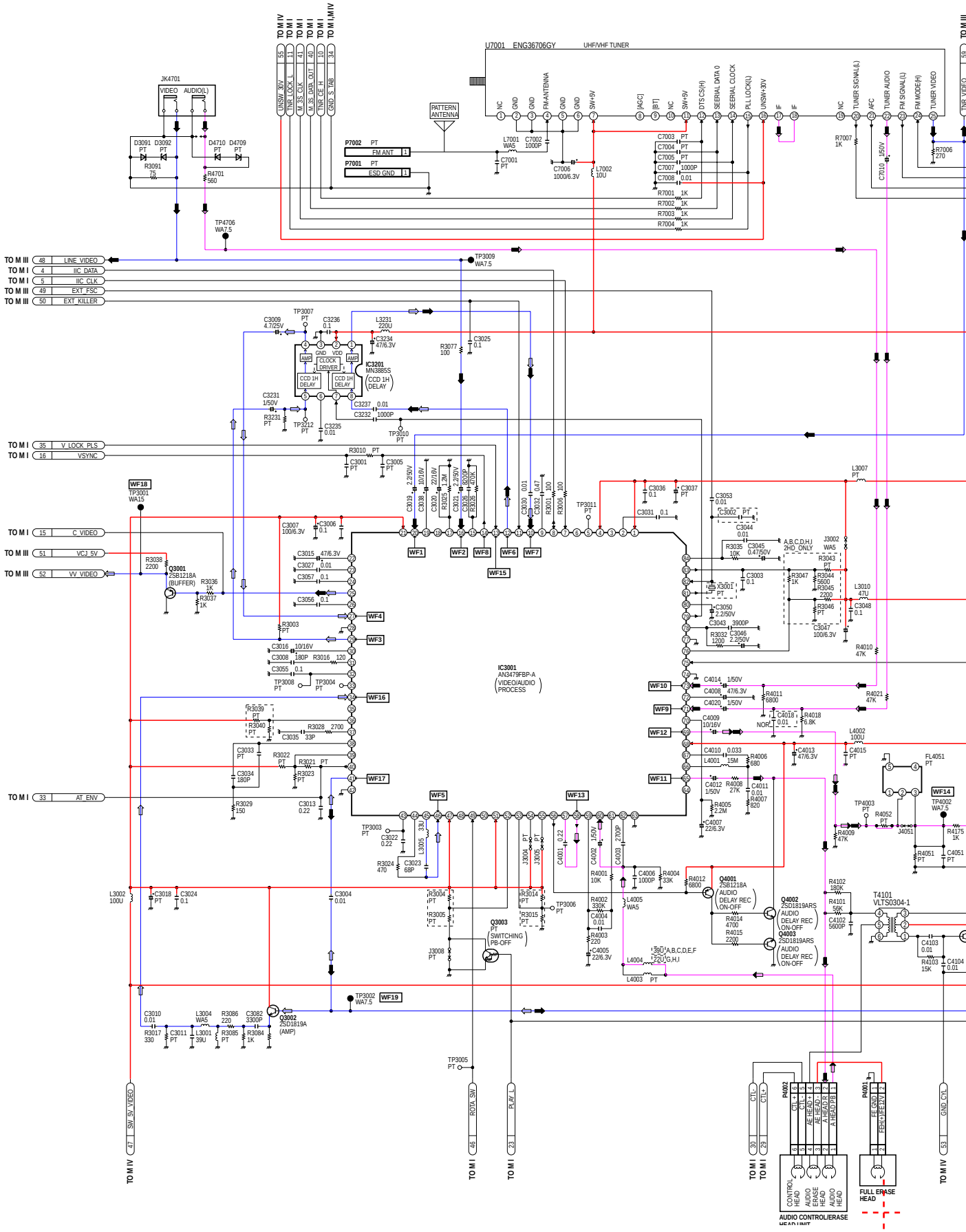


LINK TO SIGNAL WAVEFORM

LINK TO VOLTAGE CHART

LSJB2012
TV/VCR MAIN I SCHEMATIC DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN II (SIGNAL PROCESS/AUDIO/DEMODULATOR) SCHEMATIC DIAGRAM



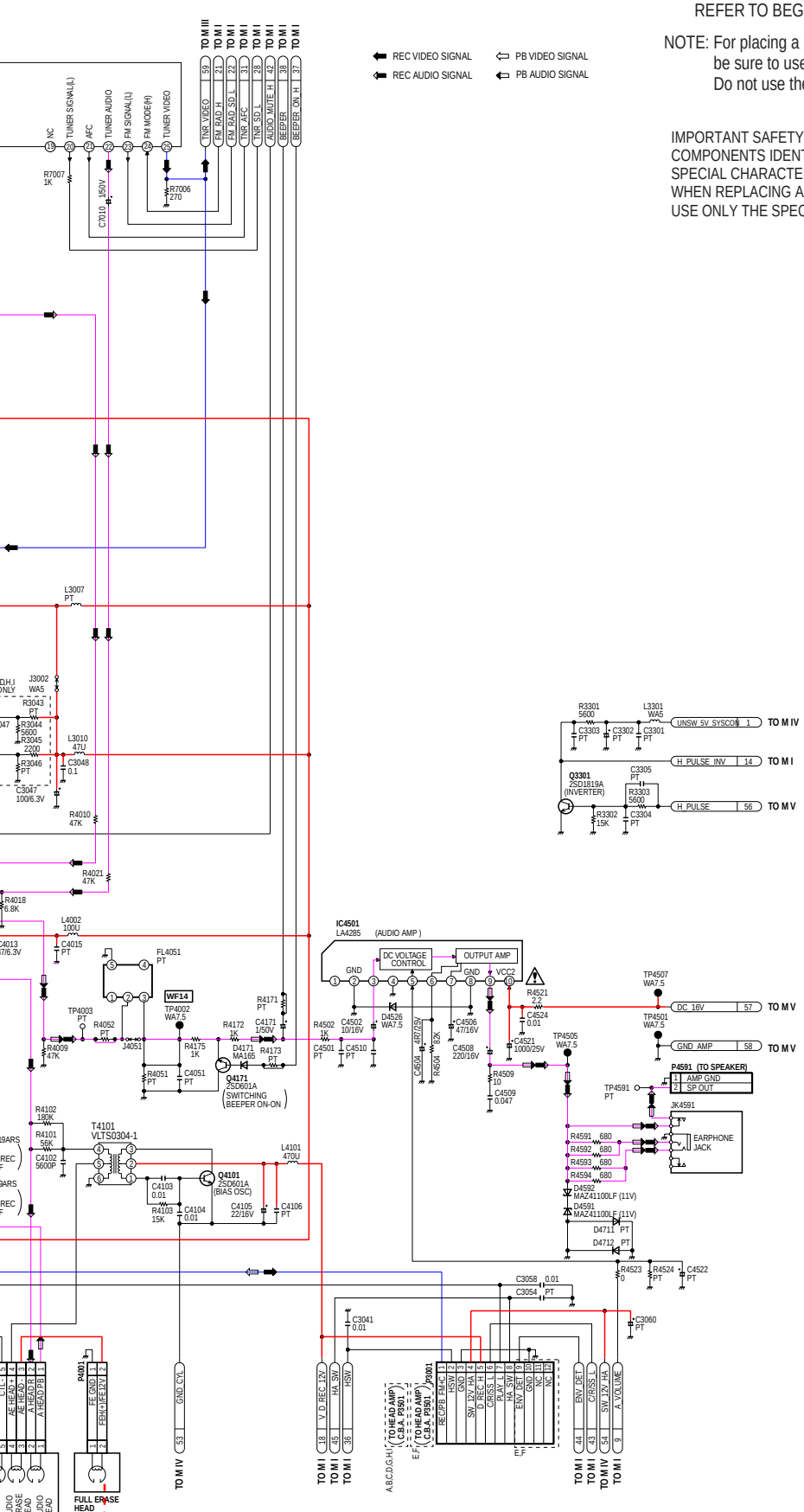
NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT

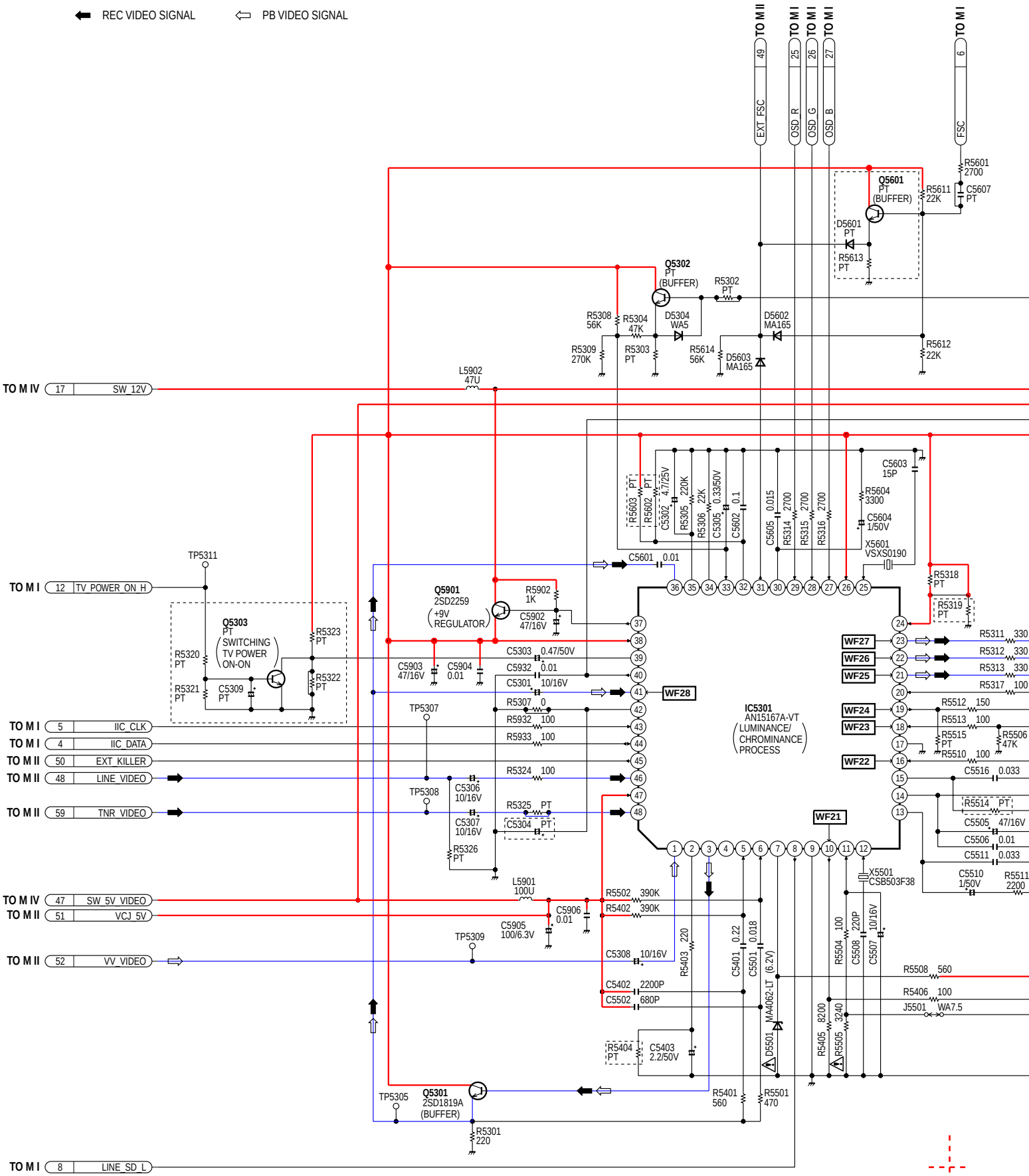


LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN II SCHEMATIC DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN III (TV Y/C PROCESS) SCHEMATIC DIAGRAM



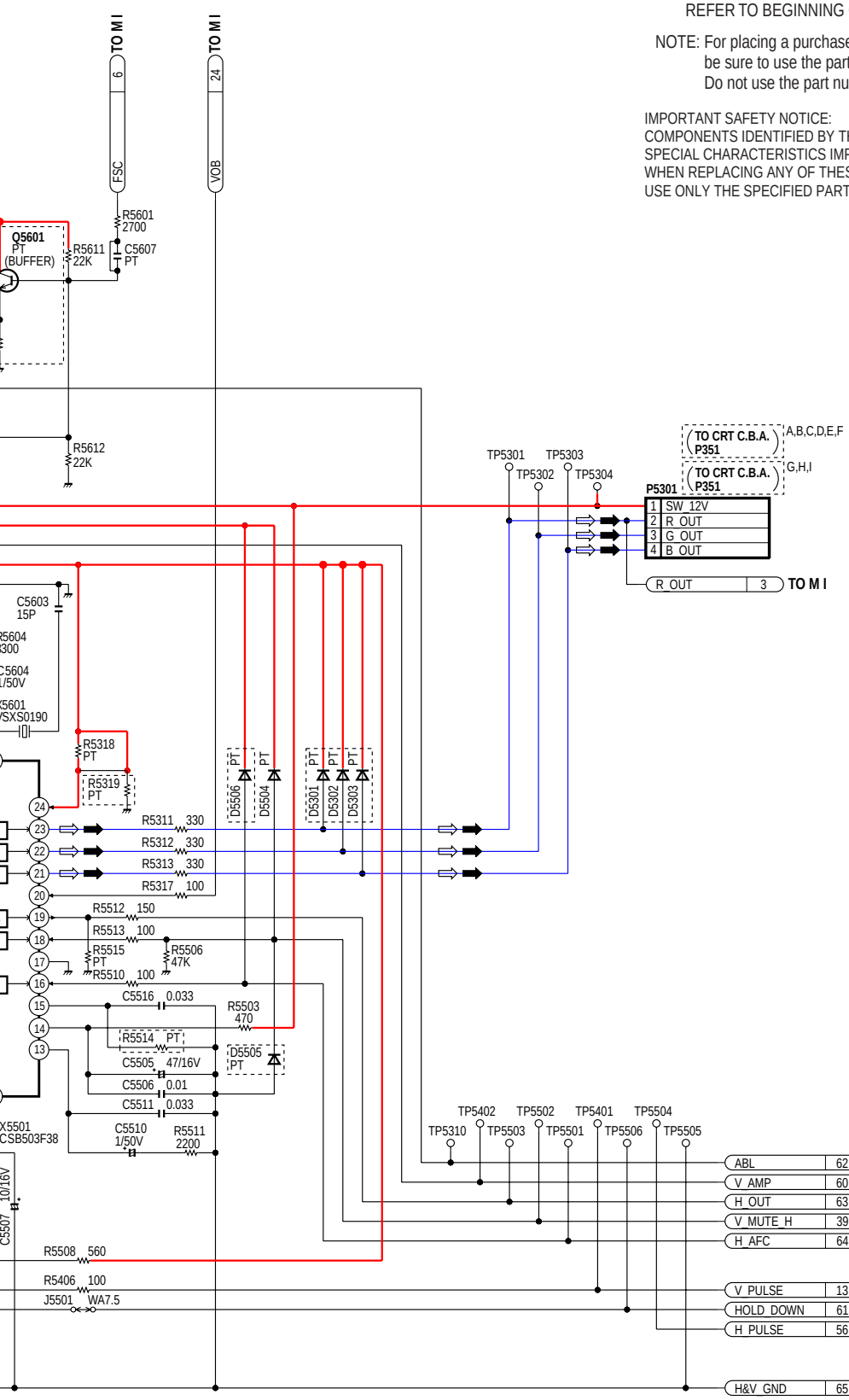
NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN III SCHEMATIC DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN IV (POWER SUPPLY) SCHEMATIC DIAGRAM

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE 4A 125/250V FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQUES D' INCENDIE N' UTILISERQUE DES FUSIBLE DE MÉME TYPE 4A 125/250V

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH THE SAME TYPE 1.6A 125/250V FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQUES D'T INCENDIE N'I UTILISERQUE DES FUSIBLE DE MÉME TYPE 1.6A 125/250V

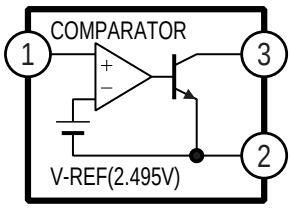
IMPORT
COMPO
SPECIAL
WHEN R
USE ON

HOT CIRCUIT. BE CAREFUL AND USE AN ISOLATION TRANSFORMER WHEN SERVICING.

HOT

TO M IV 17 SW 12V
TO M I 12 TV_POWER_ON_H
TP808 PT
R865 2200
J810 WA7.5
TP809 PT
R810 10K
TP810 PT
Q801 2SC945A (SWITCHING TV POWER ON-ON)
D805 MA167
RL801 LSSY0004
C817 PT
AC POWER CORD
P803 AC120V AC120V
TP806 PT
F801 4A 125V/250V
TP807 PT
D881 ERZV10V361CS
C808 0.082
L803 ELF21V018A
C807 JOLE00000023
R818 8.2M
D882 ERZV10V361CS
C809 100P
C802 4700P
D802 BOAAKT000010
C801 4700P
D801 BOAAKT000010
D804 BOAAKT000010
C804 4700P
DEGAUSSING COIL
DEG
R591 PT 120/5W
J593 PT
J592 WA20
D591 D4DDF5R00002
P801 AC 120V
P802 AC 120V
P1001 AC 120V
P1002 AC 120V
F1001 1.6A 125V/250V
C1001 0.01
C1002 3300P
C1025 100P
L1001 ELF15N005A
C1003 1000P
D1001 DB105G
C1004 120/200V
T1001 ETS28AD2J3AC
R1004 33K/2W
C1005 4.7/200V
C1006 220P
D1002 ERA18-04
L1006 VLPS0083
WF36
R1003 330K
Q1002 2SD1458 (SWITCHING CONTROL)
R1005 56
Q1001 2SC4533LP.KT (SWITCHING)
WF41
C1030 0.018
C1009 0.018
TP1001 WA7.5
D1003 ERA18-04
R1026 30
C1007 0.22
R1025 30
WF37
R1008 3900
R1006 2200
D1016 MA165
R1007 100
IC1001 CNC1S101R1KT (ERROR VOLTAGE DET)
WF38
C1029 100P
D1005 ERA18-04
R1010 10
C1011 47/50V
C1010 1000P
D1006 ERC30-01
L1002 22U
WF39
C1012 330/18V
D1015 MA2180LA (18V)
C1013 330/25V
D1008 ERB81-004
L1003 10U
TP1005 PT
WF40
C1016 330/18V
C1017 1000/6.3V
R1014 220
R1015 2200
C1018 0.1
R1016 1K
IC1002 TA76431AS (SHUNT REGULATOR)
R1017 2430
R1018 2200

IC1002 SHUNT REGULATOR IC- DETAIL BLOCK DIAGRAM



USE.
SQUES

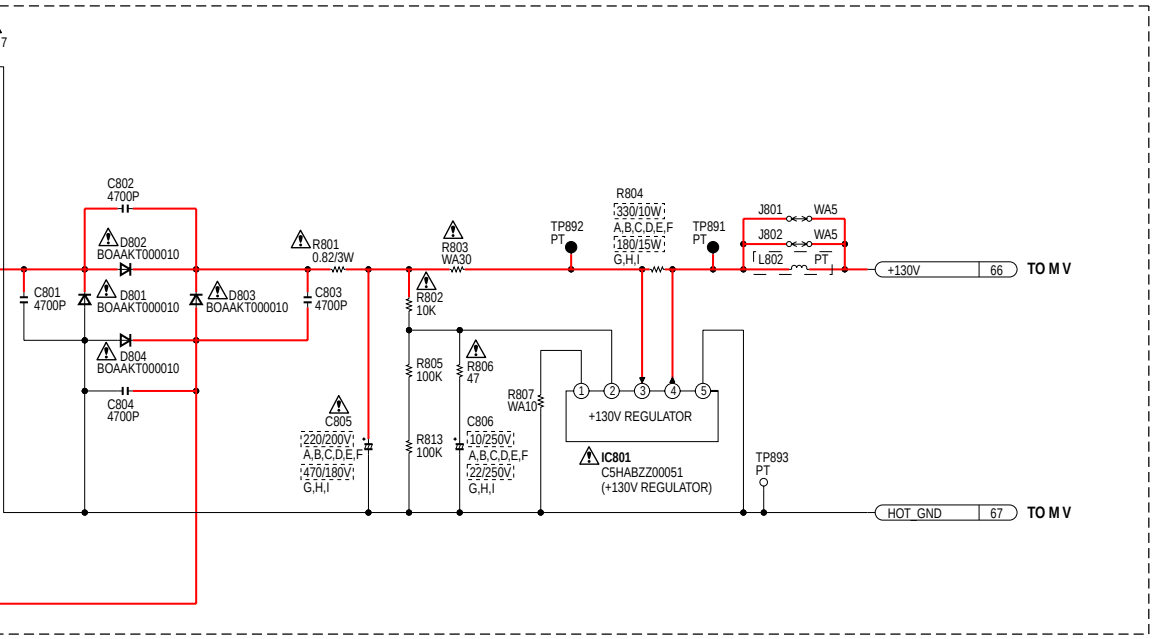
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

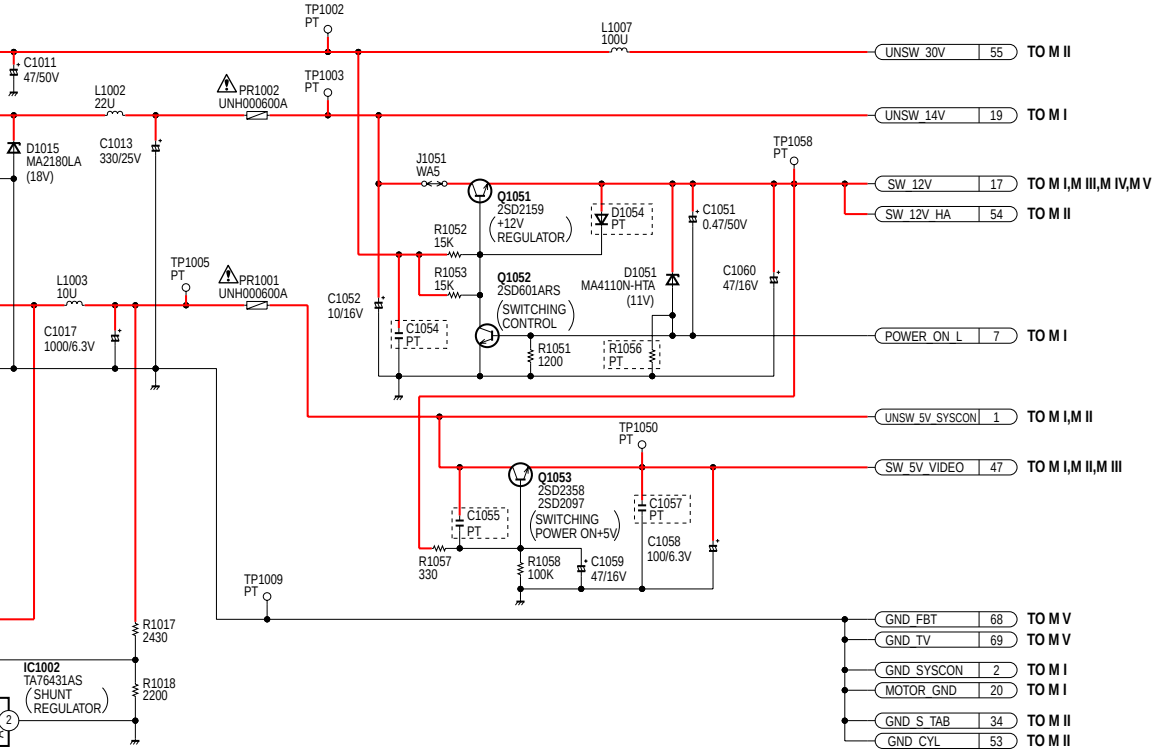
NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



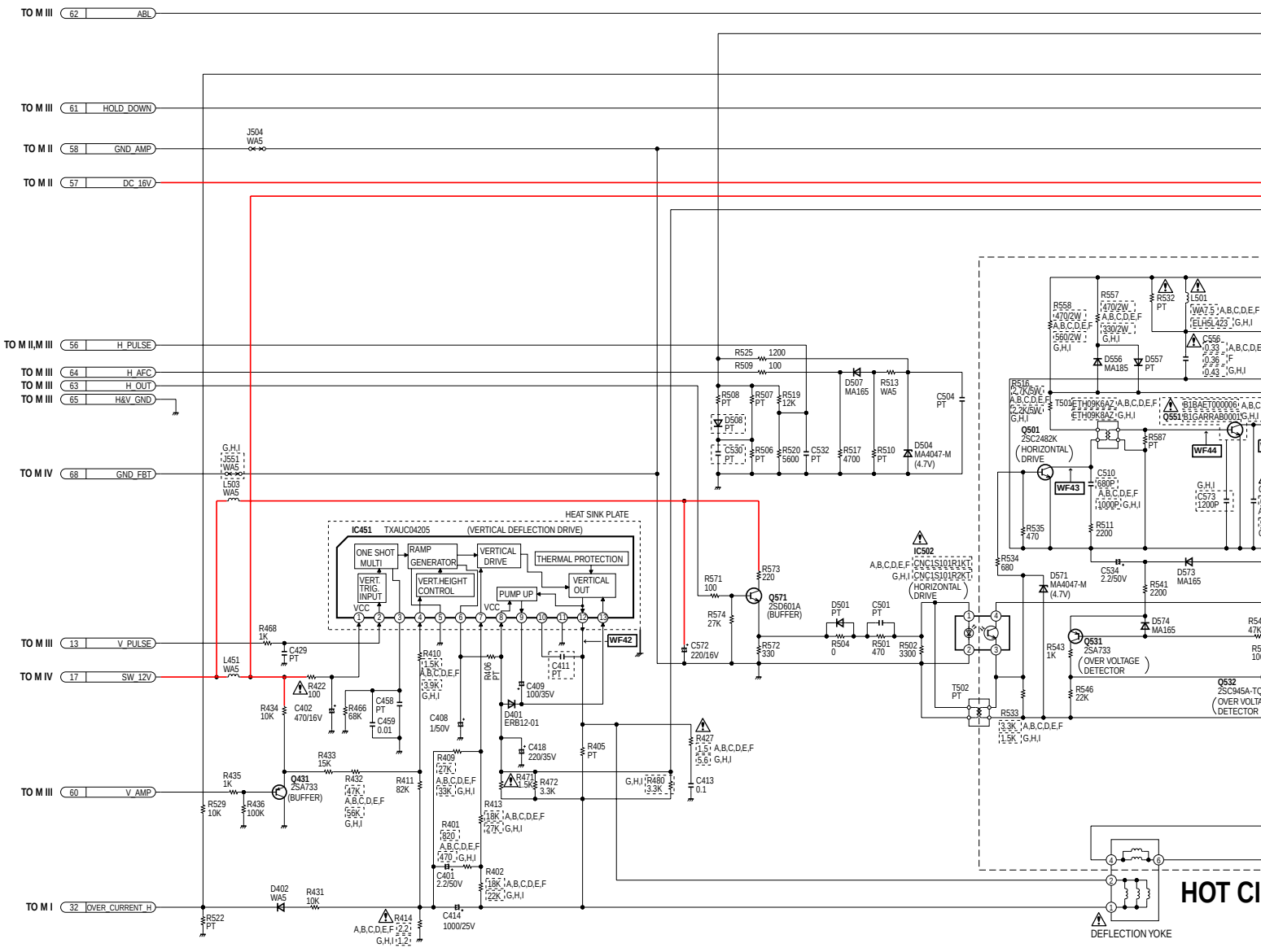


LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN IV SCHEMATIC DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN V (TV) SCHEMATIC DIAGRAM



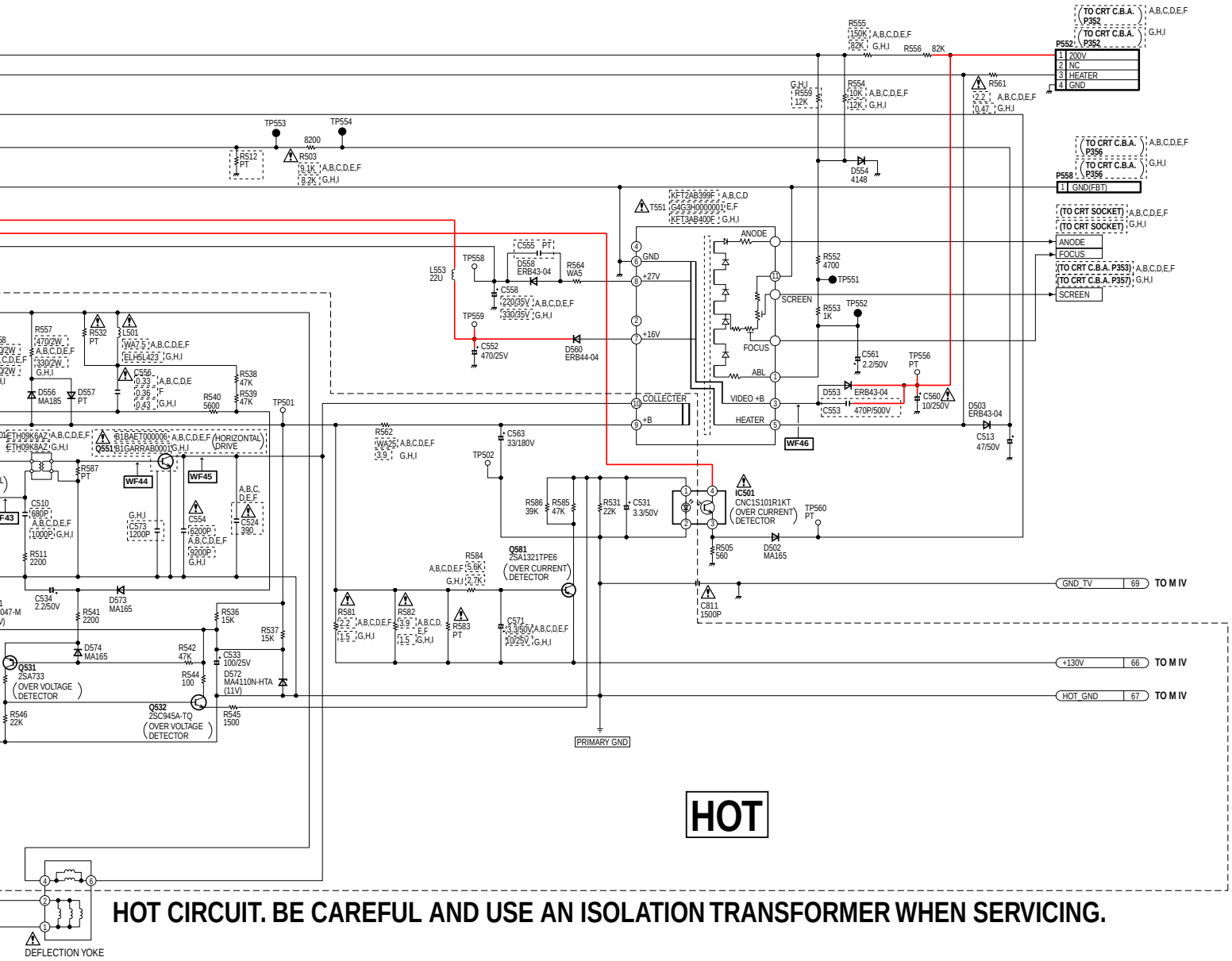
NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



HOT

HOT CIRCUIT. BE CAREFUL AND USE AN ISOLATION TRANSFORMER WHEN SERVICING.

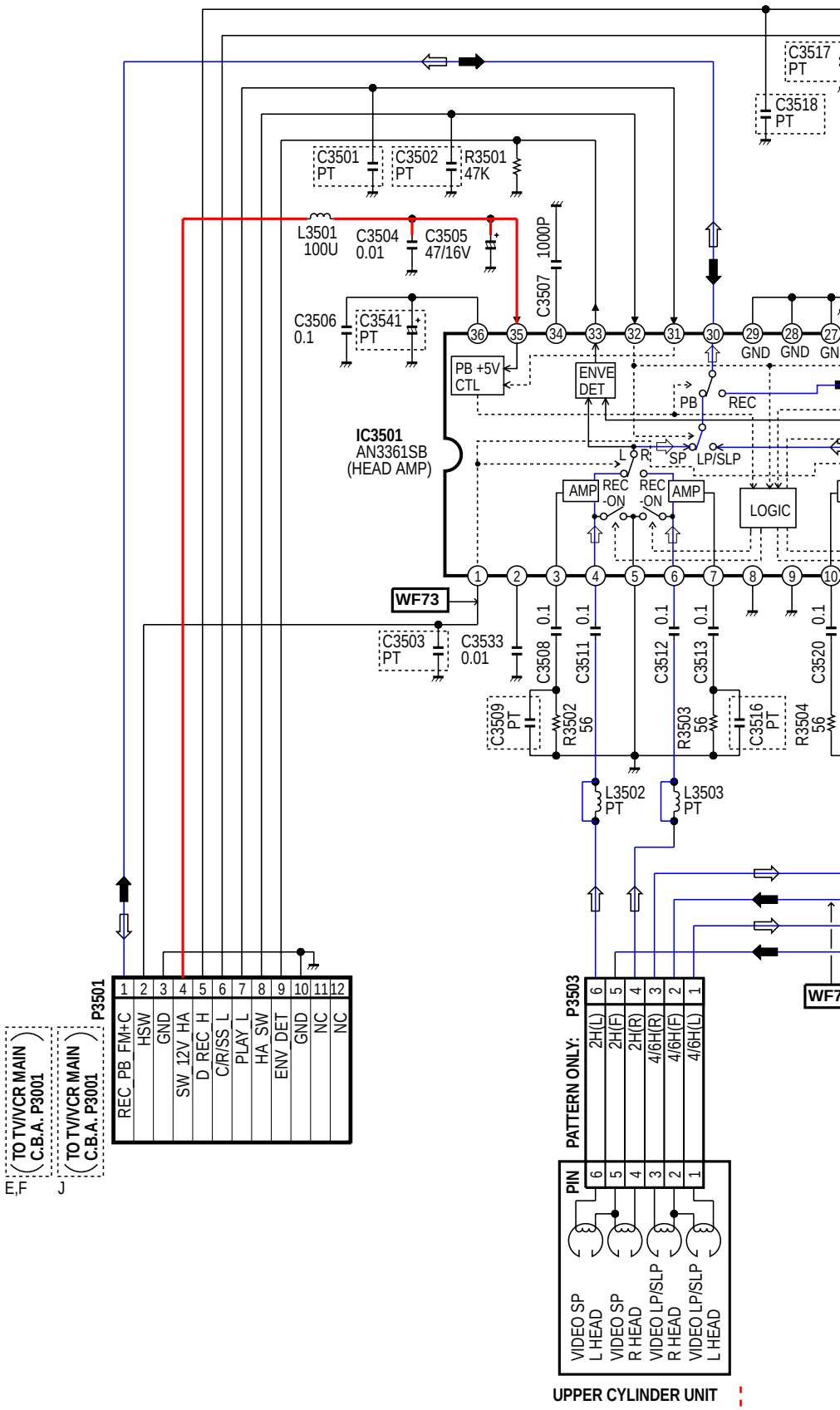
LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN V SCHEMATIC DIAGRAM
AG-513F/AG-520F

8.3. HEAD AMP SCHEMATIC DIAGRAM

HEAD AMP SCHEMATIC DIAGRAM

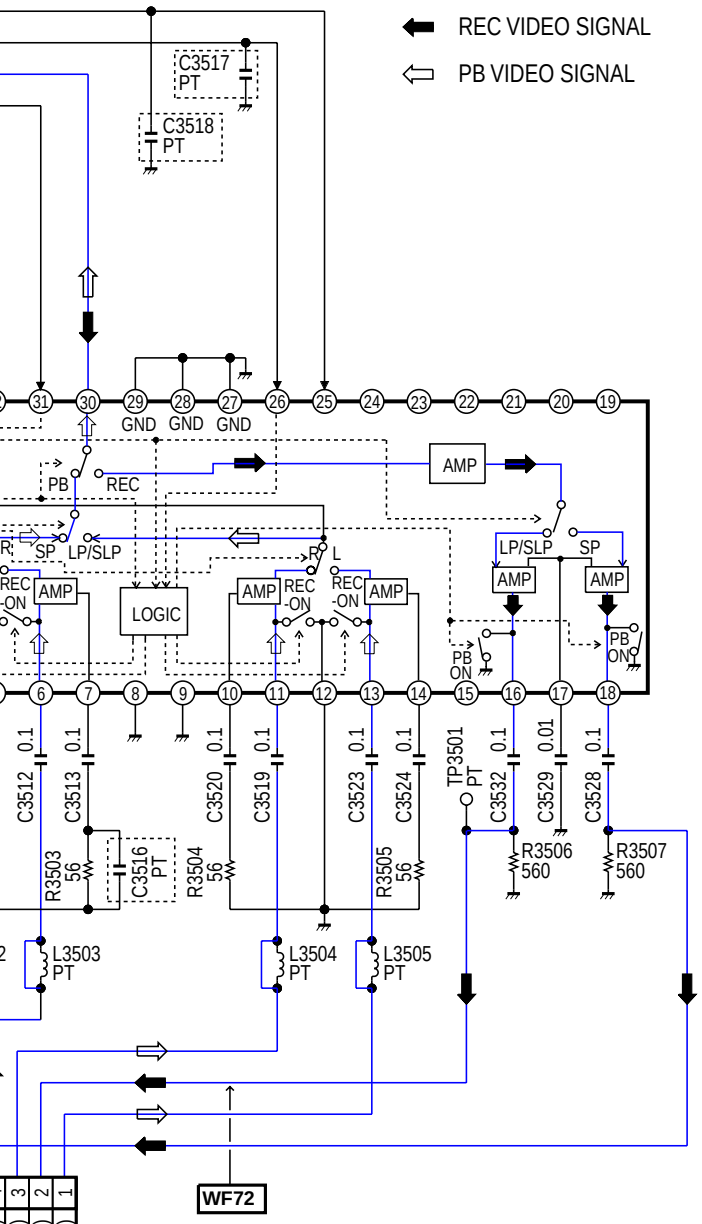


NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

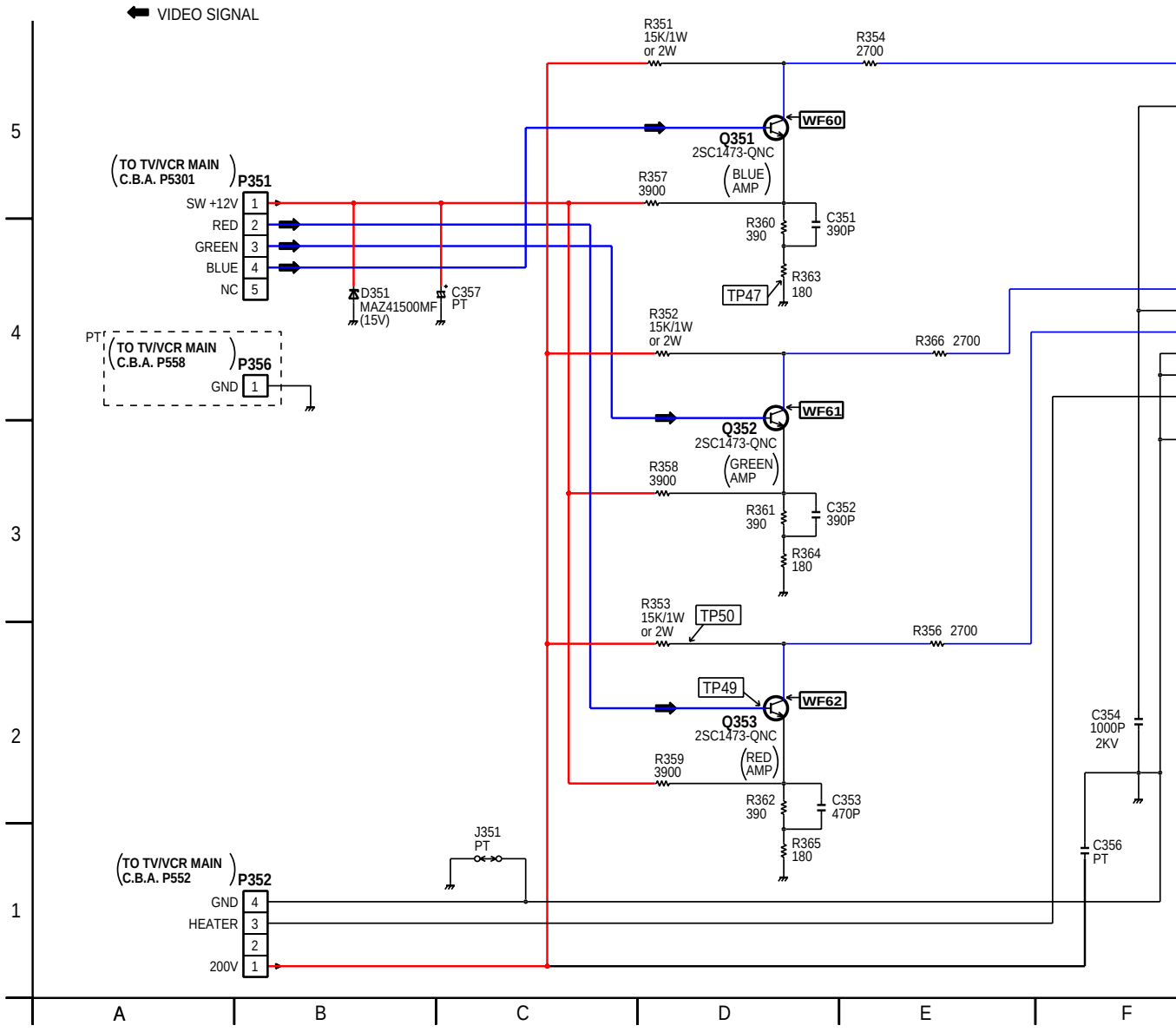
LSJB2009

AG-513F/AG-520F

HEAD AMP SCHEMATIC DIAGRAM

8.4. CRT SCHEMATIC DIAGRAM (Model: AG-513F)

CRT SCHEMATIC DIAGRAM (E)



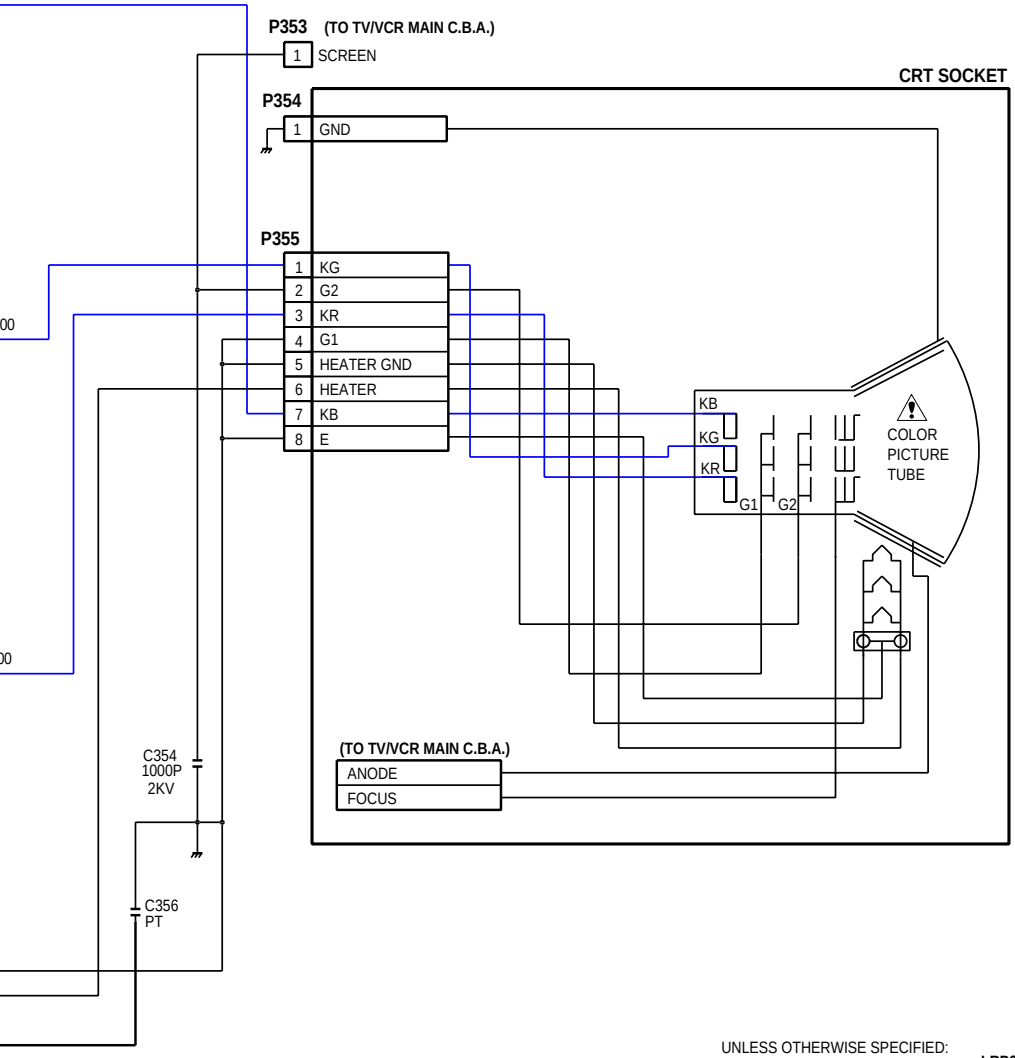
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



UNLESS OTHERWISE SPECIFIED:
WATTAGE OF RESISTORS IS 1/4W

LRP63004

F G H I

LINK TO VOLTAGE CHART

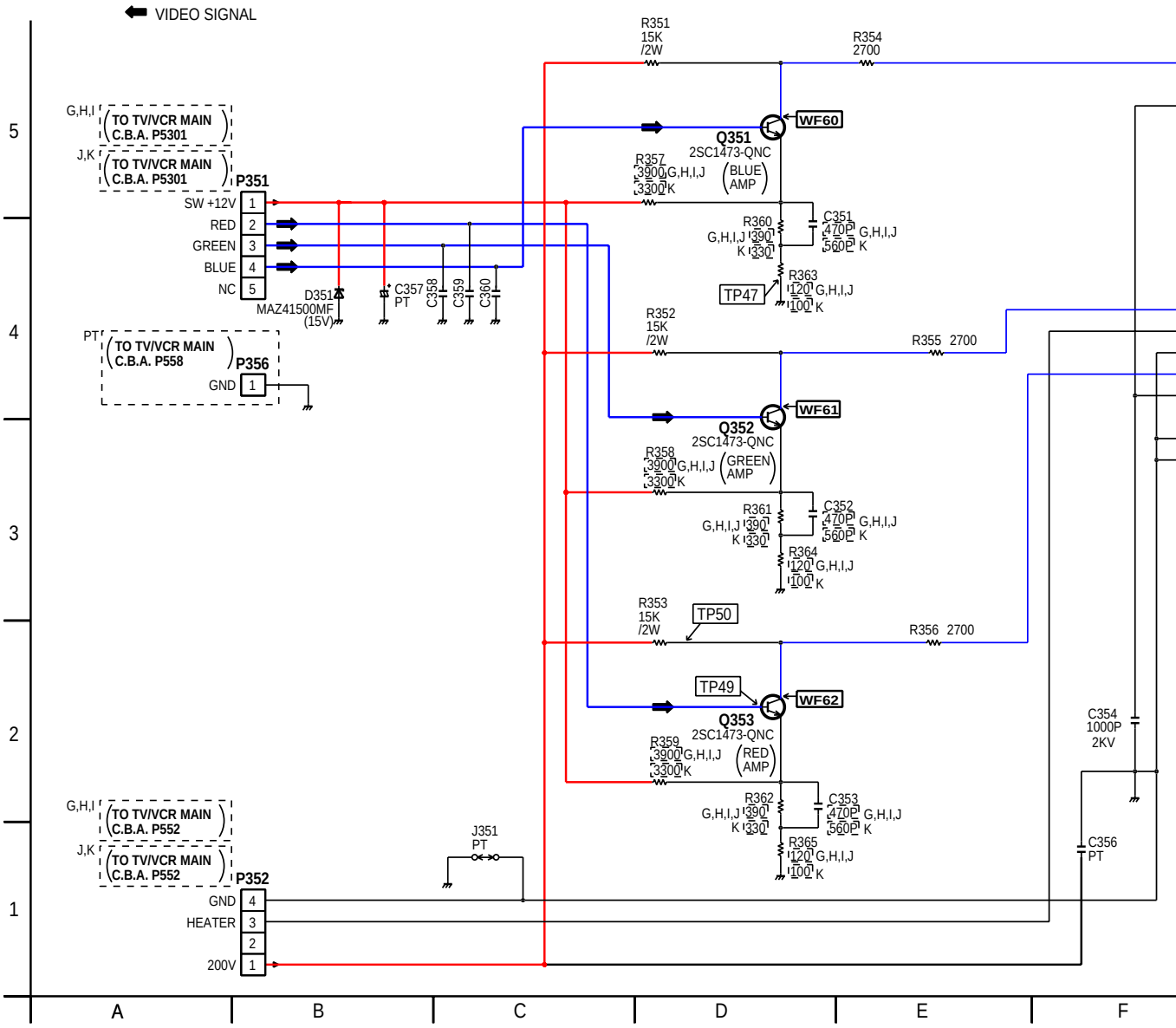
LINK TO SIGNAL WAVEFORM

AG-513F

CRT SCHEMATIC DIAGRAM

8.5. CRT SCHEMATIC DIAGRAM (Model: AG-520F)

CRT SCHEMATIC DIAGRAM (G)



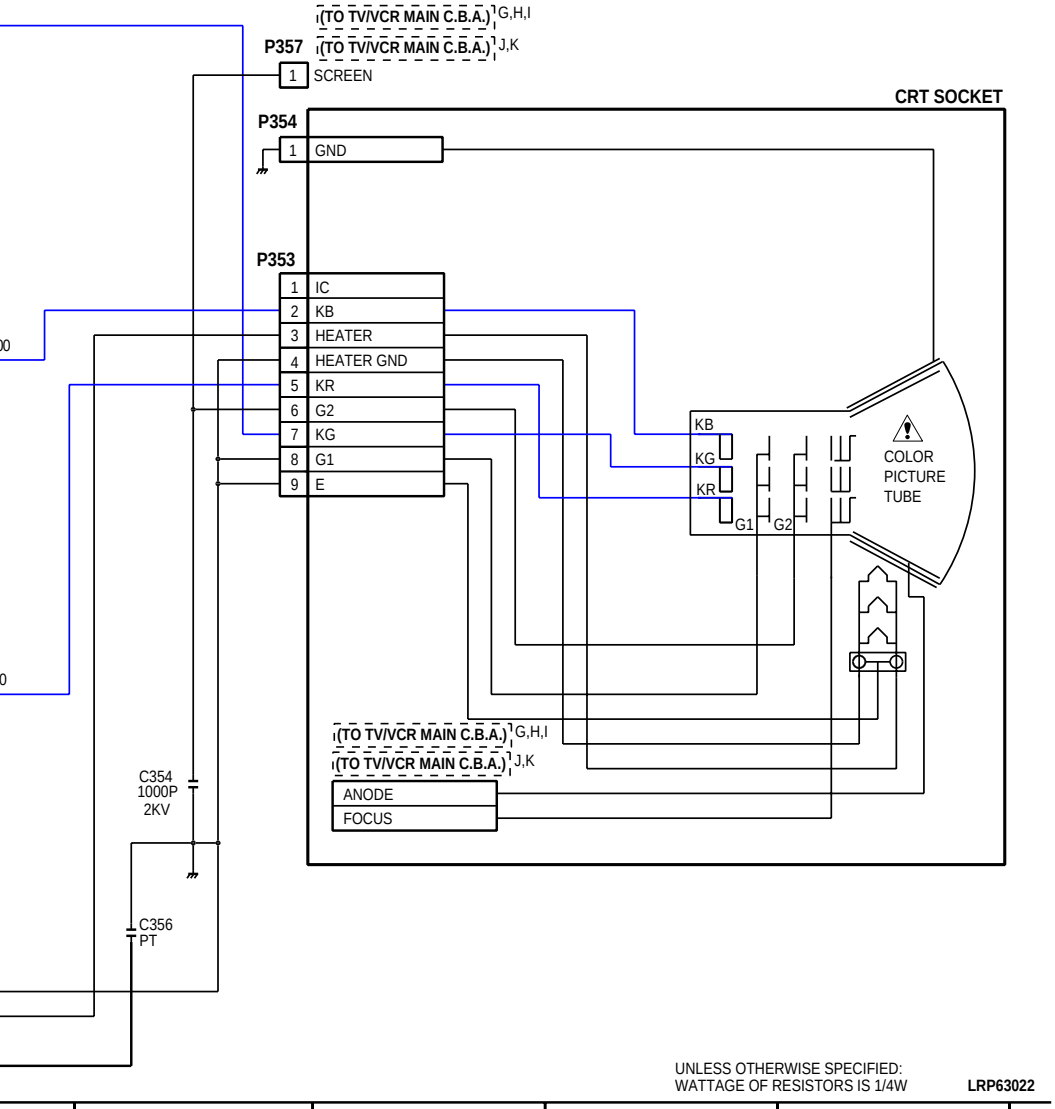
IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



UNLESS OTHERWISE SPECIFIED:
WATTAGE OF RESISTORS IS 1/4W

LRP63022

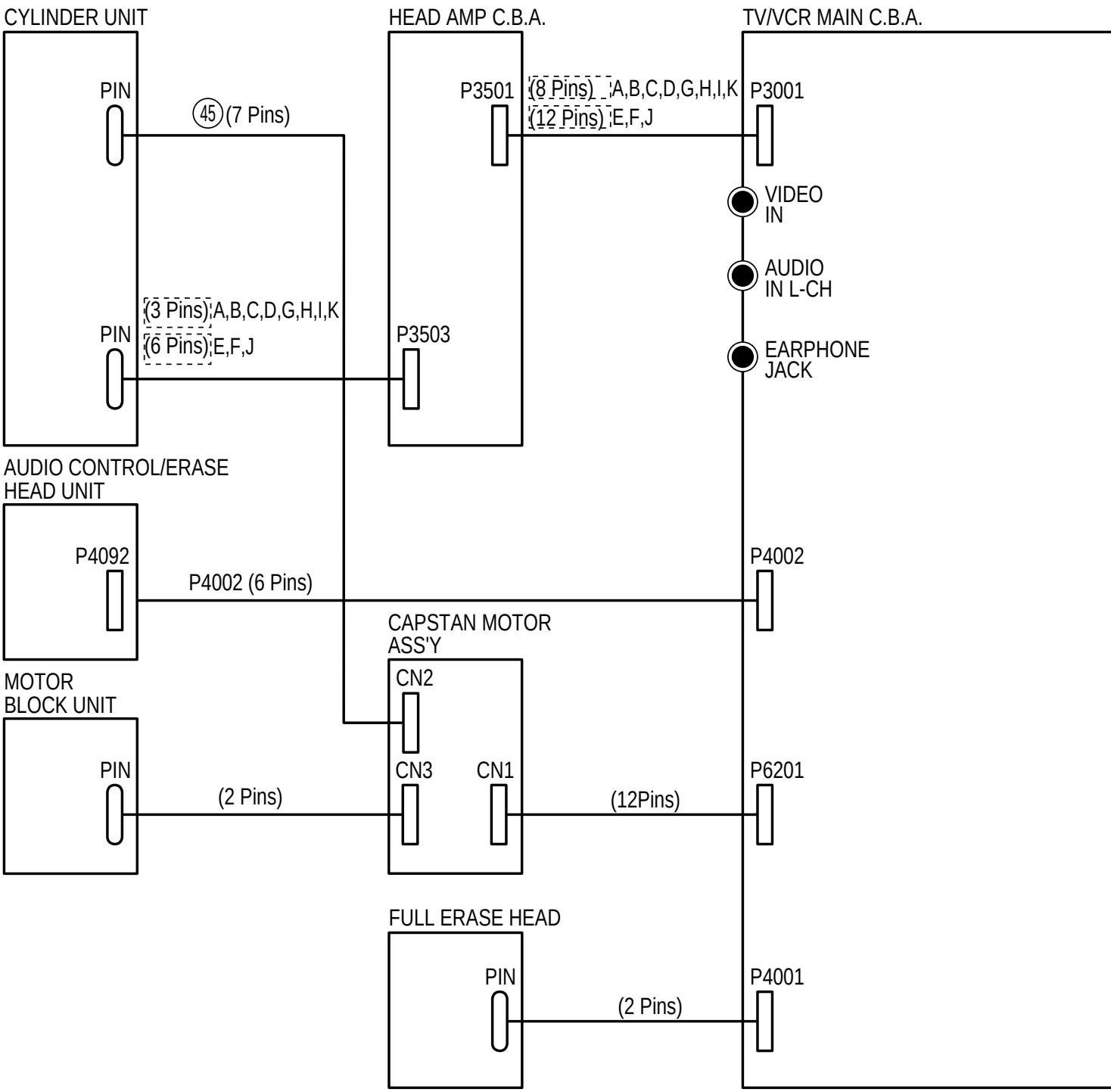
F G H I

LINK TO VOLTAGE CHART
LINK TO SIGNAL WAVEFORM

AG-520F
CRT SCHEMATIC DIAGRAM

8.6. INTERCONNECTION SCHEMATIC DIAGRAM

INTERCONNECTION SCHEMATIC DIAGRAM

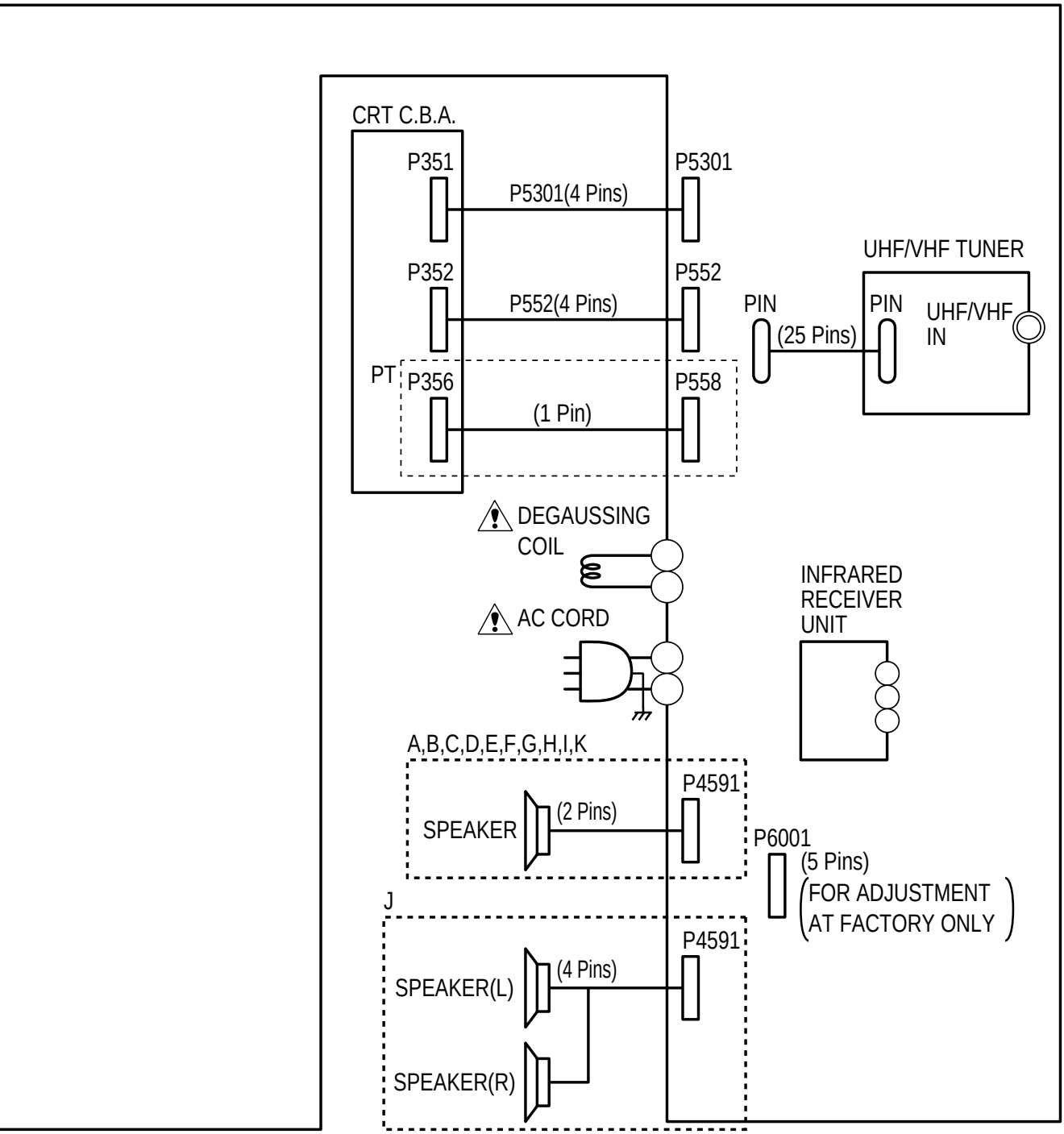


IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



INTERCONNECTION SCHEMATIC DIAGRAM
AG-513F/AG-520F

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

TV/VCR MAIN C.B.A. (POWER SUPPLY/VIDEO/AUDIO SECTION)

MODE / PIN NO.	STOP
IC451	
1	11.4
2	4.0
3	5.7
4	5.8
5	0
6	5.4
7	5.8
8	23.8
9	1.4
10	1.6
11	0
12	12.6
13	24.2
IC501	
1	0
2	0
3	0
4	12.0
IC502	
1	0
2	0.5
3	2.1
4	11.8
IC801	
1	0
2	131.8
3	170.3
4	130.3
5	0
IC1001	
1	5.3
2	4.4
3	0.7
4	2.0
IC1002	
1	2.5
2	0
3	4.1
IC3001	
1	5.0
2	3.4
3	---
4	5.0
5	2.7
6	---
7	5.2
8	5.3
9	2.2
10	2.8
11	0.4
12	2.8
13	0
14	0.4
15	1.7
16	3.1
17	2.3
18	---
19	2.6
20	3.1
21	5.0
22	2.0
23	2.6
24	2.3
25	2.0
26	2.5
27	2.0
28	0
29	1.9
30	1.8
31	2.0
32	2.4
33	2.0
34	2.8
35	---
36	2.5
37	0.1
38	4.1
39	2.3
40	3.5
41	2.8
42	0
43	3.4
44	2.6
45	2.6
46	2.6
47	5.0
48	---
49	0.1
50	---
51	5.0
52	2.5
53	2.5
54	1.8
55	2.1
56	4.5
57	2.6
58	2.7
59	2.6
60	2.6
61	2.6
62	0
63	0
64	---
65	2.6
66	2.7
67	2.7
68	5.0
69	2.7
70	2.2
71	2.6
72	2.6
73	2.6
74	0
75	0
76	3.2
77	0
78	2.2
79	3.0
80	2.2
81	2.6
82	2.8
83	2.6
84	3.8
IC3201	
1	2.8
2	5.0
3	0
4	2.9
5	3.0
6	-2.6
7	2.2
8	2.9
IC4501	
1	---
2	0
3	6.4
4	0
5	1.9
6	5.9
7	5.9
8	0
9	6.0
10	12.6
IC4511 (J)	
1	---
2	0
3	6.4
4	0
5	1.9
6	5.9
7	5.9
8	0
9	6.0
10	12.6
IC5301	
1	2.7
2	3.0
3	3.8
4	---
5	2.1
6	2.2
7	6.1
8	0.4
9	0
10	4.0
11	5.2
12	2.4
13	4.2
14	6.2
15	4.4
16	0.7
17	0
18	0.3
19	2.1
20	0
21	3.6
22	3.4
23	3.6
24	9.1
25	3.8
26	9.0
27	0
28	0
29	0
30	5.8
31	6.2
32	3.6
33	6.6
34	8.1
35	5.2
36	4.3
37	9.7
38	9.0
39	2.1
40	2.8
41	2.4
42	0
43	5.2
44	5.3
45	0.4
46	2.7
47	5.0
48	0.3
IC9001 (J)	
1	---
2	1.3
3	2.5
4	1.3
5	0.5
6	0.5
7	---
8	---
9	0.1
10	5.0
11	0.1
12	---
13	1.3
14	1.3
15	2.6
16	---
17	0.5
18	0.5
19	5.0
20	---
21	4.2
22	1.3
23	1.3
24	5.0
25	0
26	---
27	0.1
28	0.5
29	4.2
30	4.2
31	---
32	2.6
IC9201 (J)	
1	3.1
2	3.8
3	5.2
4	4.4
5	0
6	5.2
7	4.5
8	2.8
9	2.8
IC9301 (J)	
1	0
2	0
3	0
4	0
5	0
6	0
7	-5.7
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	5.2
Q431	
E	3.3
C	0
B	2.7
Q501	
E	0
C	76.0
B	0.5
Q531	
E	11.6
C	0
B	11.4
Q532	
E	0
C	11.9
B	0
Q551	
E	0
C	---
B	0
Q571	
E	1.5
C	10.7
B	2.1
Q581	
E	130.0
C	0
B	130.5
Q801	
E	0
C	12.0
B	0.8
Q1001	
E	0
C	176.3
B	0.3
Q1002	
E	0
C	0.3
B	0.7
Q1051	
E	12.0
C	14.0
B	11.3
Q1052	
E	0
C	11.3
B	0.6
Q1053	
E	5.0
C	5.0
B	6.0
Q1070(J,K)	
E	11.9
C	11.9
B	11.3
Q1071(J,K)	
E	-28.8
C	-28.6
B	-28.1
Q3001	
E	1.7
C	0
B	1.0
Q3002	
E	1.8
C	5.0
B	2.5
Q3301	
E	0
C	4.3
B	-0.3
Q4001	
E	5.0
C	5.1
B	4.5
Q4002	
E	0
C	0
B	0.8
Q4003	
E	0
C	0
B	0.8
Q4101	
E	0
C	0.2
B	0.2
Q4171	
E	0.1
C	0
B	0.1
Q5301	
E	3.2
C	9.1
B	3.8
Q5901	
E	9.1
C	12.0
B	9.7
Q9001 (J)	
E	0
C	5.2
B	0
Q9002 (J)	
E	0.2
C	0
B	0
Q9201 (J)	
E	0
C	2.8
B	8.7
Q9202 (J)	
E	0
C	2.8
B	8.7
TP501	130.6
TP502	0
TP551	-5.2
TP552	-5.9
TP553	5.3
TP554	19.5
TP556	200.0
TP558	24.2
TP559	16.0
TP806	120.0
TP807	120.0
TP808	3.5
TP809	0
TP810	12.0
TP891	130.0
TP892	120.0
TP893	0
TP1001	0
TP1002	30.0
TP1003	14.0
TP1005	5.0
TP1009	0
TP1050	5.0
TP1058	12.0
TP3001	1.7
TP3002	2.5
TP3003	3.4
TP3004	2.0
TP3005	0.1
TP3006	2.5
TP3007	2.4
TP3008	2.4
TP3009	0
TP3010	3.0
TP3011	2.7
TP3212	3.0
TP4002	0
TP4003	0
TP4501	0
TP4505	-0.7
TP4507	16.0
TP4591	-0.7
TP4706	0
TP5301	3.5
TP5302	3.5
TP5303	3.5
TP5304	12.0
TP5305	3.2
TP5307	0
TP5308	1.5
TP5309	1.7
TP5310	5.7
TP5311	3.5
TP5401	4.0
TP5402	2.8
TP5501	0.7
TP5502	0.1
TP5503	2.1
TP5504	-0.1
TP5505	0
TP5506	5.3

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K

VOLTAGE CHART
AG-513F/AG-520F

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

TV/VCR MAIN C.B.A. (SYSTEM CONTROL/SERVO SECTION)

MODE / PIN NO.	REC	PLAY
IC6001		
1	5.3	5.0
2	5.2	5.2
3	---	---
4	---	---
5	5.2	5.2
6	0.1	5.2
7	0.1	0
8	0.3	5.2
9	1.5	1.3
10	5.2	5.2
11	0.1	0
12	0.1	0.1
13	0.1	0
14	5.1	5.1
15	0.3	0.1
16	5.1	5.1
17	5.3	5.3
18	5.2	5.2
19	0.5	1.6
20	0.3	0
21	5.1	5.1
22	0.1	0.3
23	2.6	2.6
24	0.1	0
25	5.1	5.1
26	0.5	2.6
27	0	2.6
28	0.1	0.1
29	5.2	0
30	0.6	0.6
31	0	0
32	1.9	1.9
33	2.7	2.7
34	2.6	2.6
35	2.0	2.4
36	5.0	5.0
37	2.4	2.4
38	2.5	2.3
39	0	0
40	0.3	0.3
41	0.1	0.1
42	1.0	0
43	1.4	1.4
44	4.8	4.8
45	3.9	3.9
46	4.3	4.2
47	1.8	2.1
48	0	1.9
49	2.0	2.1
50	0.3	2.7
51	5.0	5.0
52	2.6	2.6
53	2.6	2.6
54	0	0

MODE / PIN NO.	REC	PLAY
55	3.4	0.6
56	3.7	0.5
57	4.9	4.8
58	5.1	0
59	0	0
60	2.6	2.5
61	0	0
62	0	0
63	0	0
64	0.2	0.1
65	1.4	1.4
66	4.8	4.8
67	2.4	2.4
68	3.7	0.4
69	2.6	2.6
70	2.6	2.6
71	0	0
72	2.6	2.6
73	5.2	5.2
74	3.0	---
75	2.2	0.2
76	2.6	2.6
77	0.2	0.2
78	2.4	2.4
79	0.2	0
80	4.9	0.7
81	4.9	4.5
82	3.4	2.8
83	5.1	5.0
84	2.0	0.2
85	0.1	0.1
86	5.2	0.3
87	5.2	5.2
88	5.2	0.7
89	5.2	0.7
90	0.7	0.6
91	5.2	5.2
92	0.7	0.4
93	4.9	5.0
94	5.1	0.3
95	0	0
96	5.0	4.9
97	0	0
98	2.6	2.6
99	0.6	0.5
100	0.1	0.2
IC6002		
1	1.2	1.2
2	0	0
3	0	0
4	---	---
IC6003		
1	2.4	2.4
2	1.2	---
3	0	0

MODE / PIN NO.	REC	PLAY
4	5.2	5.1
IC6004		
1	0	0
2	0	0
3	0	0
4	0	0
5	5.3	5.3
6	5.2	5.2
7	0	0
8	5.0	5.0
IC6005		
1	5.2	5.2
2	5.0	5.0
3	0	0
4	0	0
5	5.0	5.0
6	0	0
Q6001		
E	12.0	---
C	12.0	0.3
B	11.3	11.7
Q6002		
E	4.5	0
C	11.3	12.1
B	5.2	0
Q6003		
E	0	0
C	0.2	0.2
B	0.8	0.8
Q6004		
E	5.2	5.2
C	5.2	5.2
B	4.5	4.5
Q6005		
E	5.3	5.3
C	5.2	5.2
B	4.4	4.4
Q6006		
E	0	0
C	5.2	5.2
B	0	0
Q6009		
E	0	0
C	5.2	5.2
Q6010		
E	0	0
C	5.1	5.2
TP6001	5.2	5.0
TP6002	5.2	5.2
TP6003	3.4	2.9
TP6004	---	---
TP6005	5.1	5.2
TP6006	0	0

MODE / PIN NO.	REC	PLAY
TP6007	5.2	5.2
TP6008	0	0
TP6009	5.0	5.0
TP6013	0	2.6
TP6021	0	0
TP6022	5.1	5.1
TP6023	0	0
TP6099	5.1	5.1
TP6101	5.2	5.2
TP6103	5.1	5.1
TP6104	5.3	5.2
TP6105	0.1	0
TP6106	5.0	5.0
TP6107	0	0
TP6108	3.9	3.9
TP6109	5.1	5.1
TP6111	0	0
TP6201	2.7	2.7
TP6202	2.6	2.6
TP6203	2.4	2.4
TP6204	1.4	1.4
TP6205	2.6	2.9
TP6206	3.0	2.6
TP6207	2.6	2.6
TP6208	2.7	2.7
TP6209	2.1	2.7
TP6401	0	0.1

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

HEAD AMP C.B.A.

MODE / PIN NO.	STOP
IC3501	
1	0
2	0
3	0.5
4	0
5	0
6	0
7	0.5
8	0
9	0
10	0.5
11	0
12	0
13	0.1
14	0.1
15	---
16	2.4
17	2.4
18	0
19	---
20	---
21	---
22	---
23	---
24	---
25	0.2
26	5.1
27	0
28	0
29	0
30	2.5
31	5.2
32	4.9
33	0.2
34	0.1
35	11.9
36	0.1
TP3501	0

CRT C.B.A. (E)

MODE / PIN NO.	STOP
Q351	
E	3.1
C	131.1
B	3.5
Q352	
E	3.1
C	127.9
B	3.5
Q353	
E	3.0
C	131.9
B	3.5
TP47	0
TP49	3.5
TP50	131.9

CRT C.B.A. (G)

MODE / PIN NO.	STOP
Q351	
E	3.1
C	131.1
B	3.5
Q352	
E	3.1
C	127.9
B	3.5
Q353	
E	3.0
C	131.9
B	3.5
TP47	0
TP49	3.5
TP50	131.9

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K

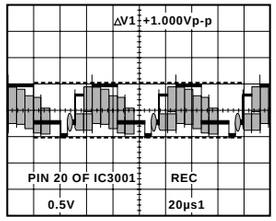
VOLTAGE CHART
AG-513F/AG-520F

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

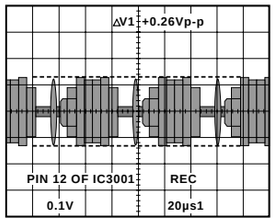
COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K

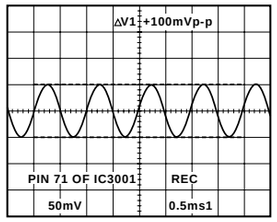
TV/VCR MAIN C.B.A.



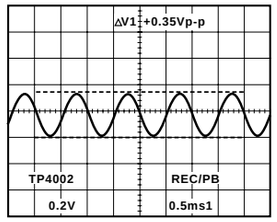
WF1



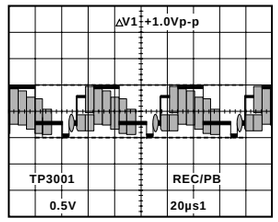
WF6



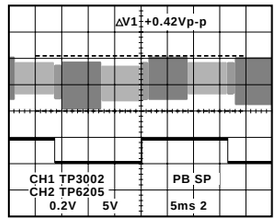
WF9



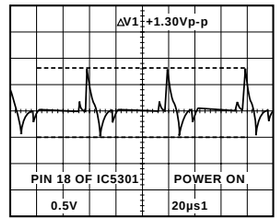
WF14



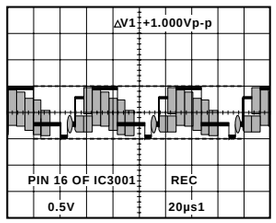
WF18



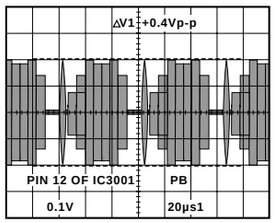
CH1 WF19
CH2 WF32
(E,F,J)



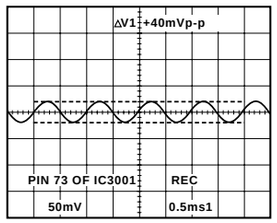
WF23



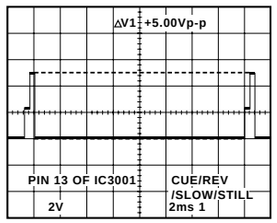
WF2



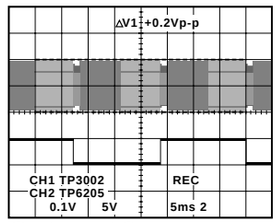
WF6



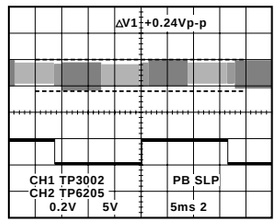
WF10



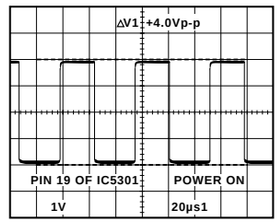
WF15



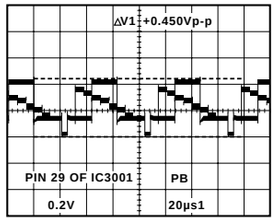
CH1 WF19
CH2 WF32
(A,B,C,D,G,H,I,K)



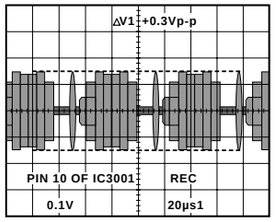
CH1 WF19
CH2 WF32
(E,F,J)



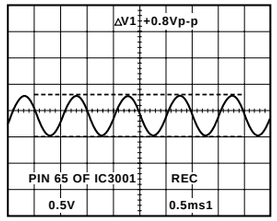
WF24



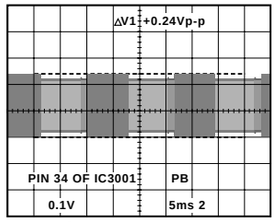
WF3



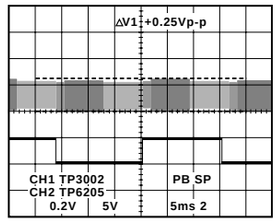
WF7



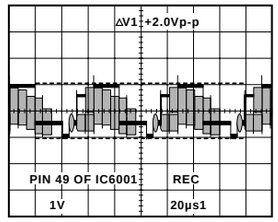
WF11



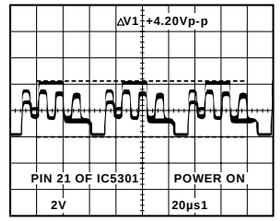
WF16



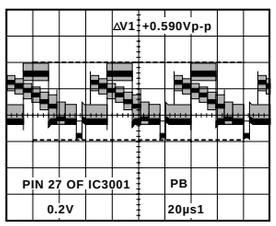
CH1 WF19
CH2 WF32
(A,B,C,D,G,H,I,K)



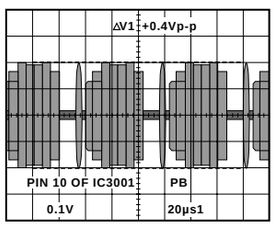
WF20



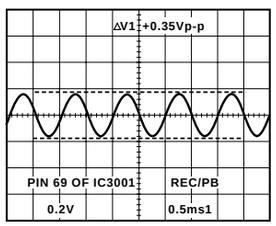
WF25



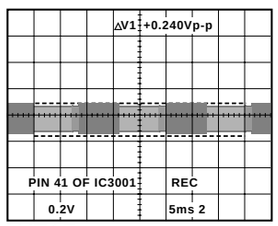
WF4



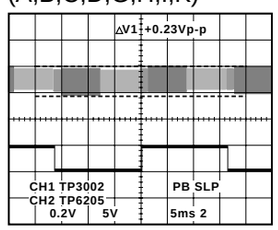
WF7



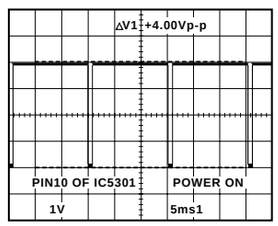
WF12



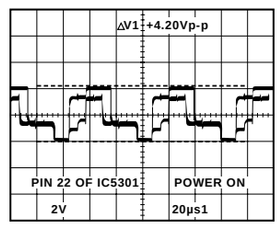
WF17



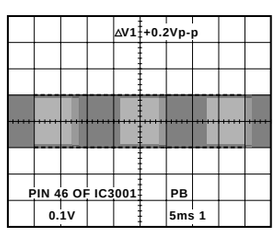
CH1 WF19
CH2 WF32
(A,B,C,D,G,H,I,K)



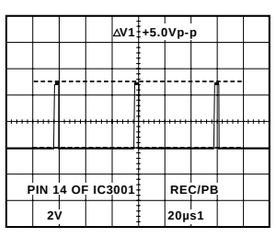
WF21



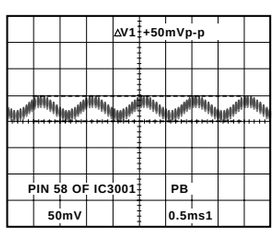
WF26



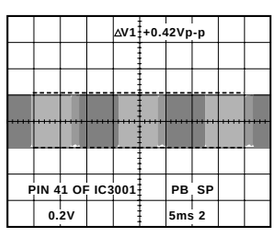
WF5



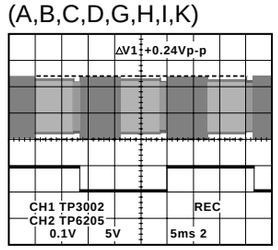
WF8



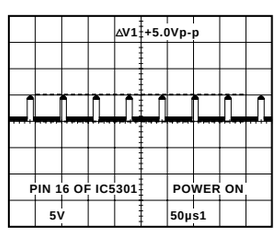
WF13



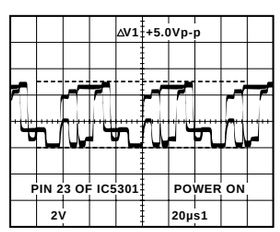
WF17



CH1 WF19
CH2 WF32
(E,F,J)



WF22



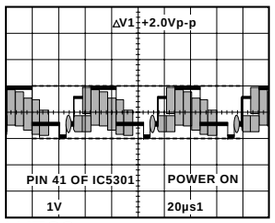
WF27

SIGNAL WAVEFORMS
AG-513F/AG-520F

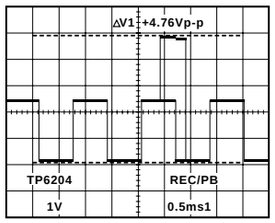
NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

COMPARISON CHART OF MODELS & MARKS

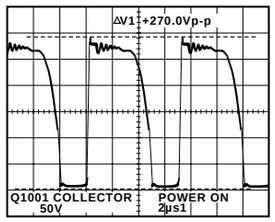
MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K



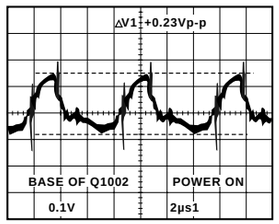
WF28



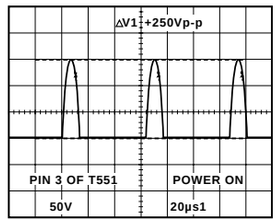
WF31



WF36

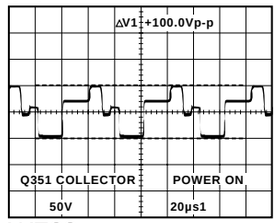


WF41



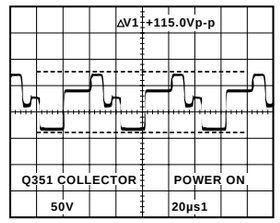
WF46

CRT C.B.A. (E)

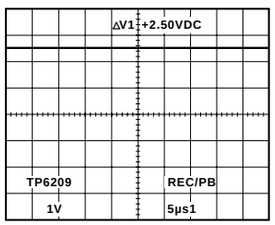


WF60

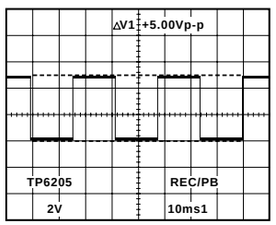
CRT C.B.A. (G)



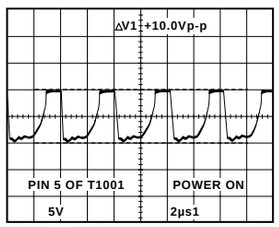
WF60



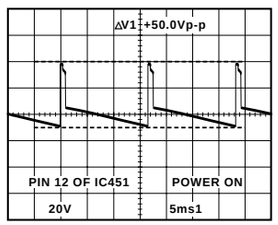
WF29



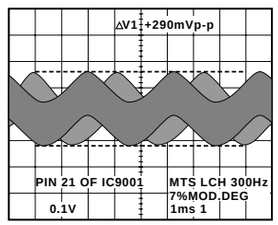
WF32



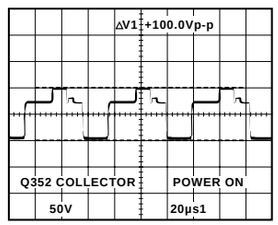
WF37



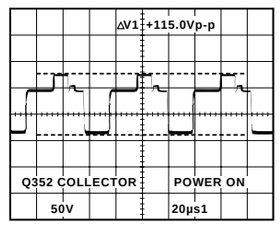
WF42



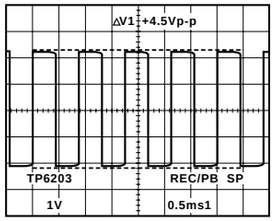
WF47
(J)



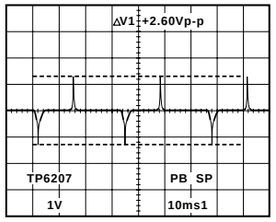
WF61



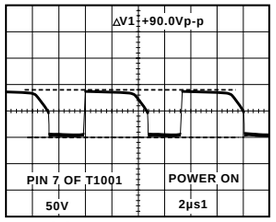
WF61



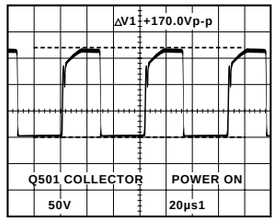
WF30



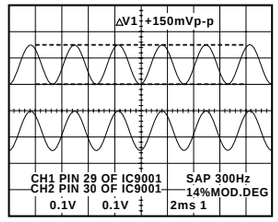
WF33



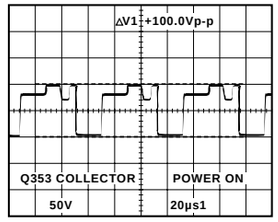
WF38



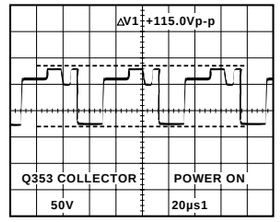
WF43



CH1 WF48
CH2 WF49
(J)



WF62



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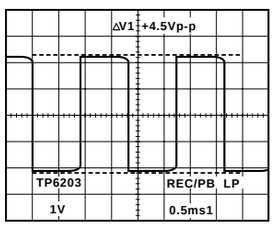
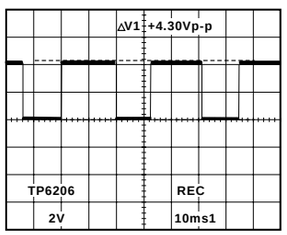
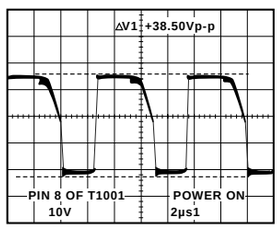


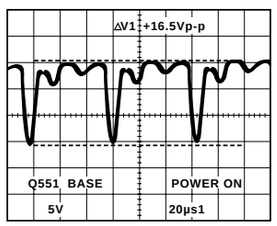
WF30



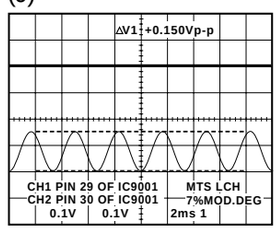
WF34



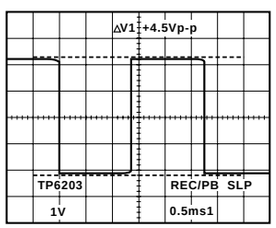
WF39



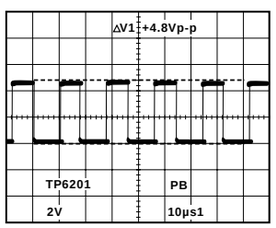
WF44



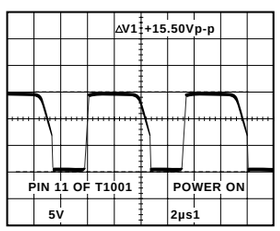
CH1 WF48
CH2 WF49
(J)



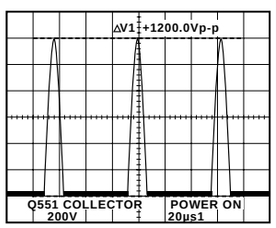
WF30



WF35



WF40



WF45

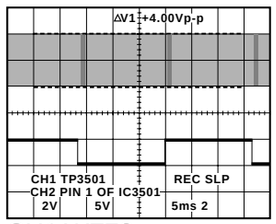
SIGNAL WAVEFORMS
AG-513F/AG-520F

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K

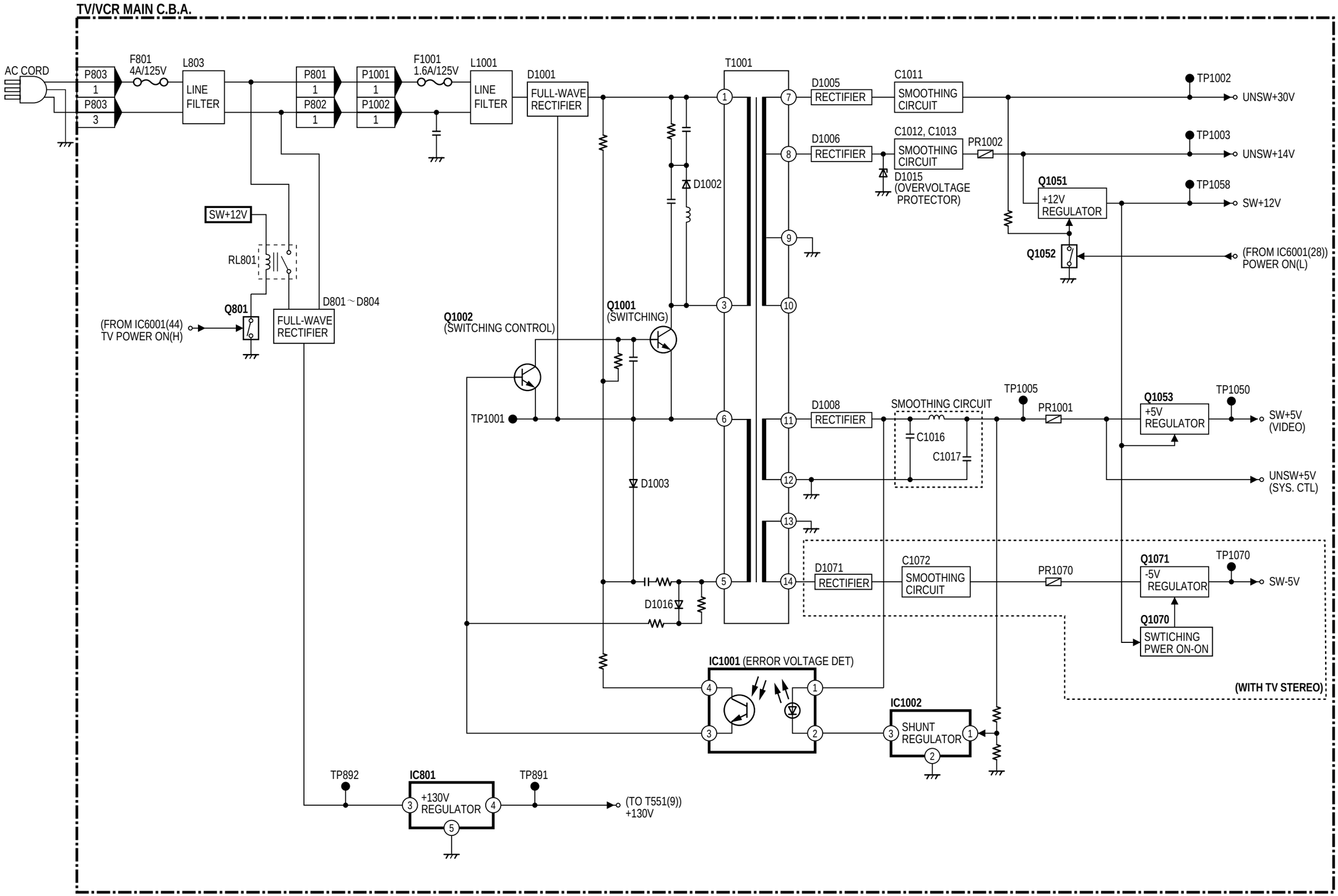
HEAD AMP C.B.A.



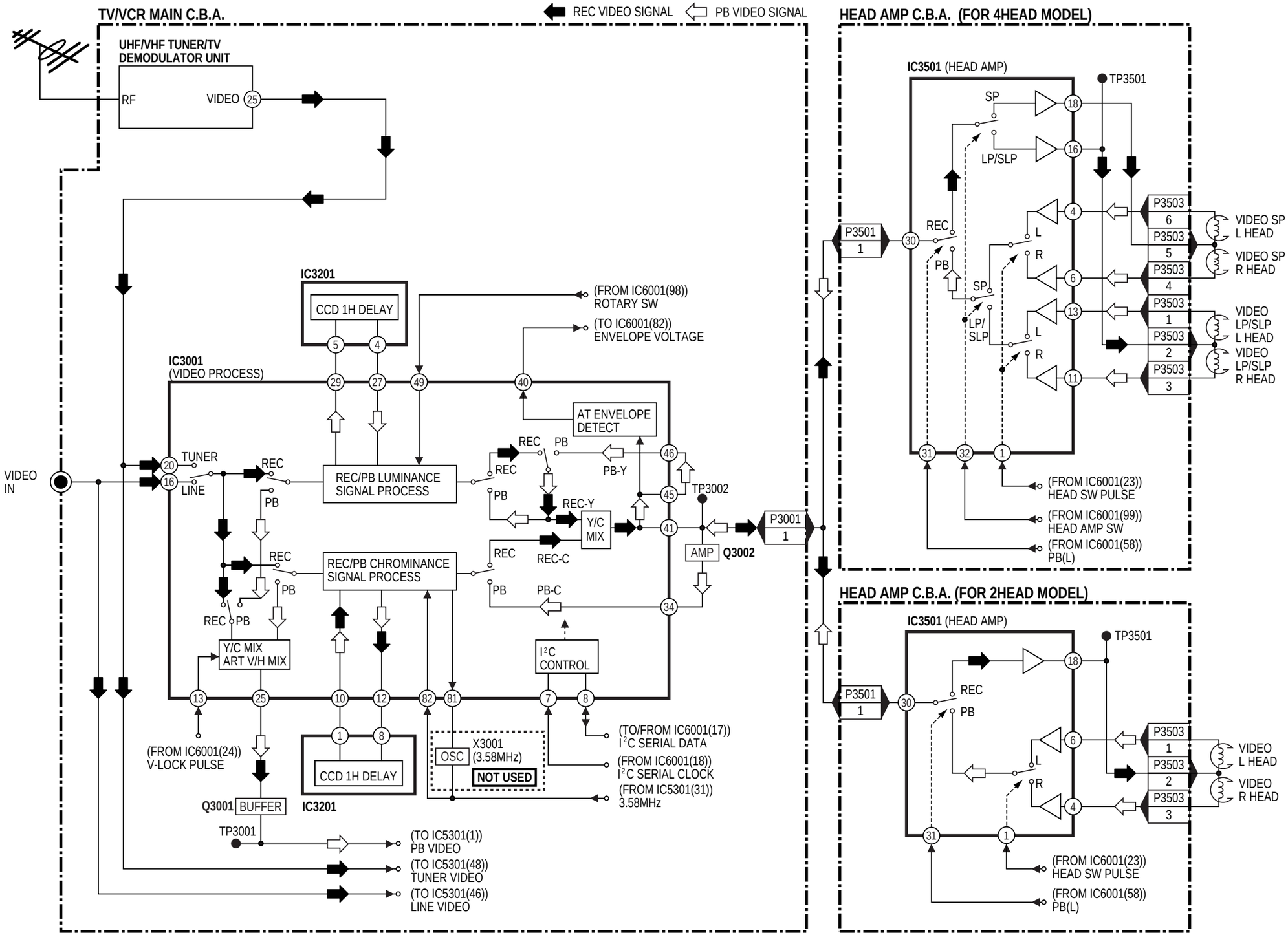
CH1 WF72
CH2 WF73

SIGNAL WAVEFORMS
AG-513F/AG-520F

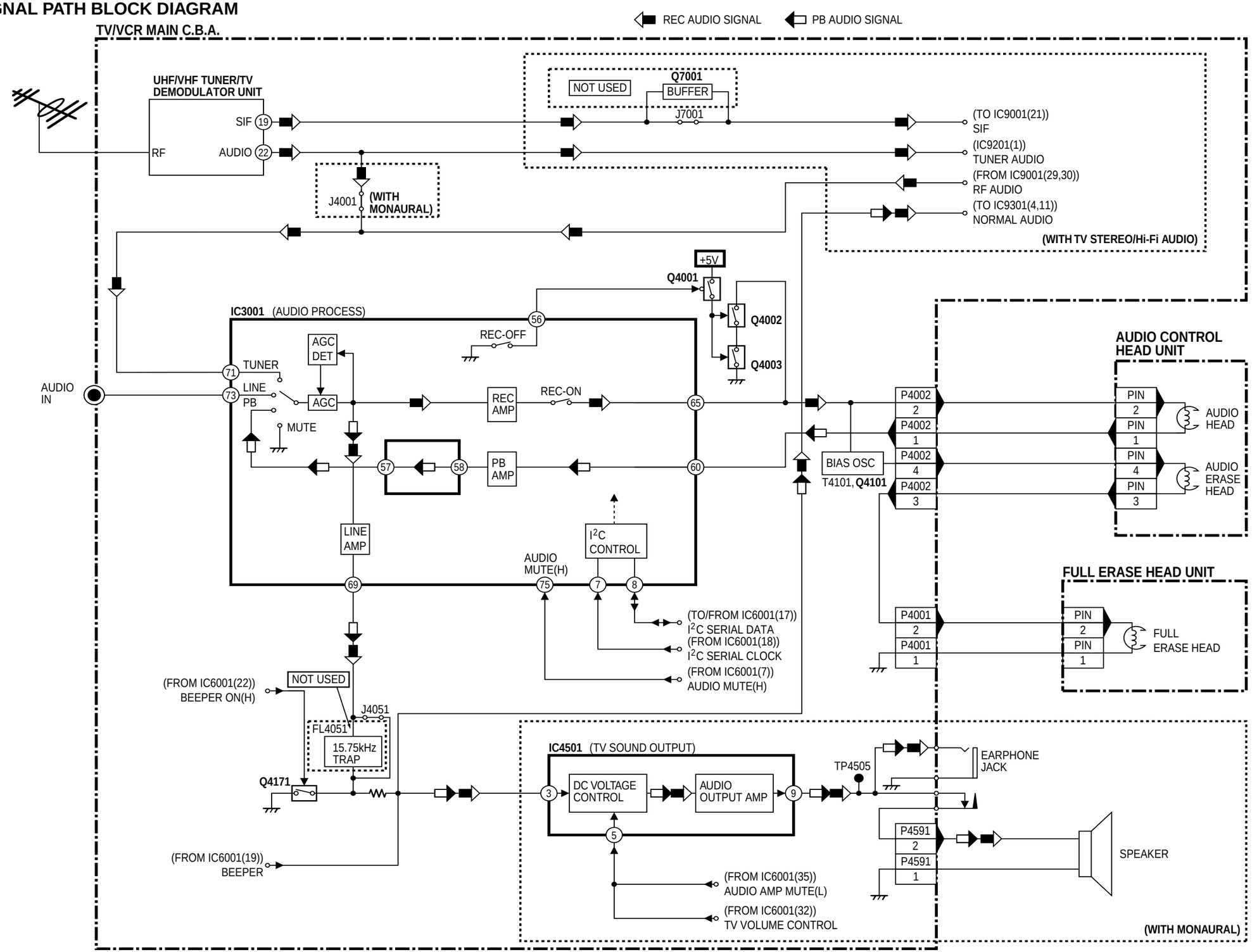
POWER SUPPLY BLOCK DIAGRAM



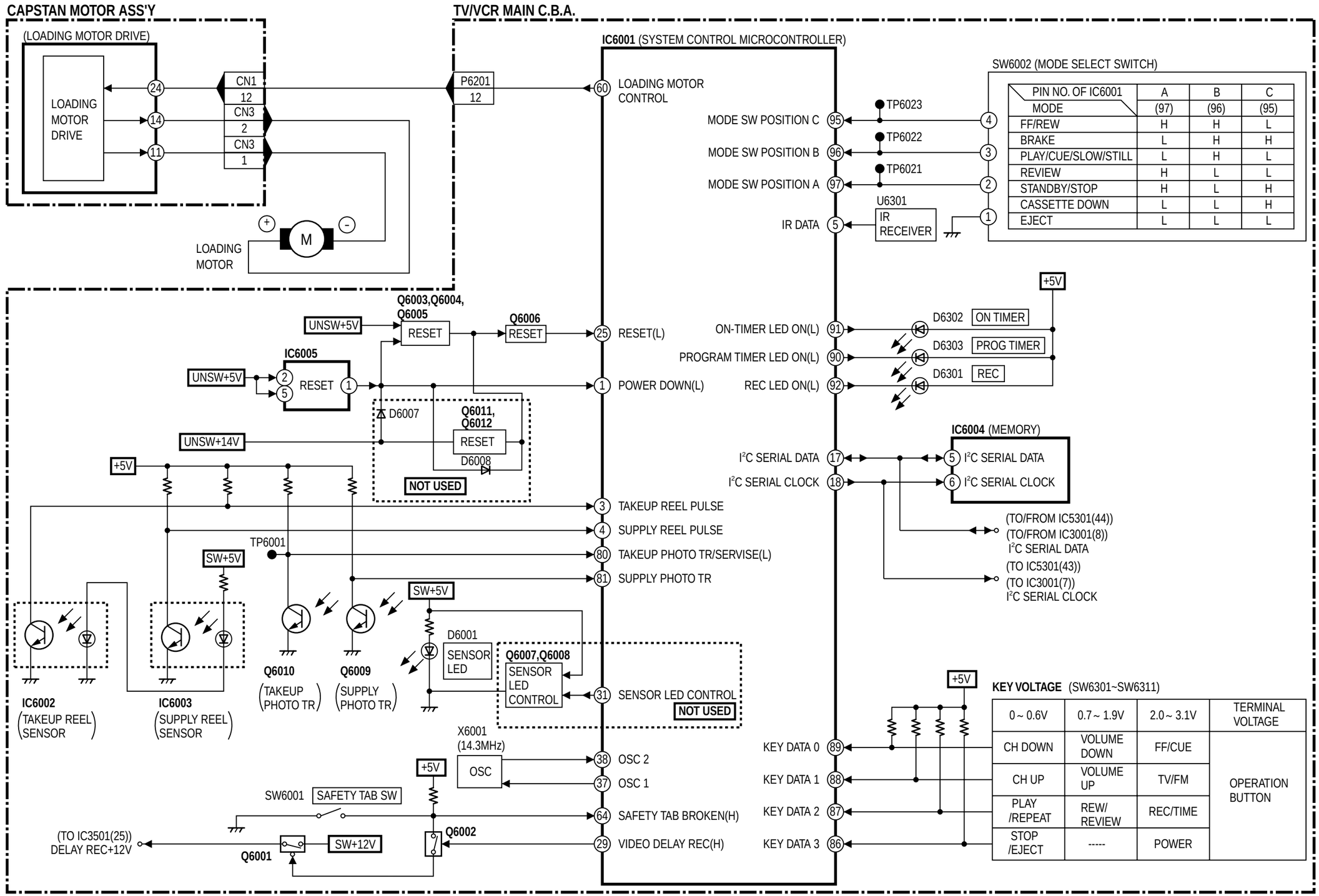
VIDEO SIGNAL PATH BLOCK DIAGRAM



AUDIO SIGNAL PATH BLOCK DIAGRAM

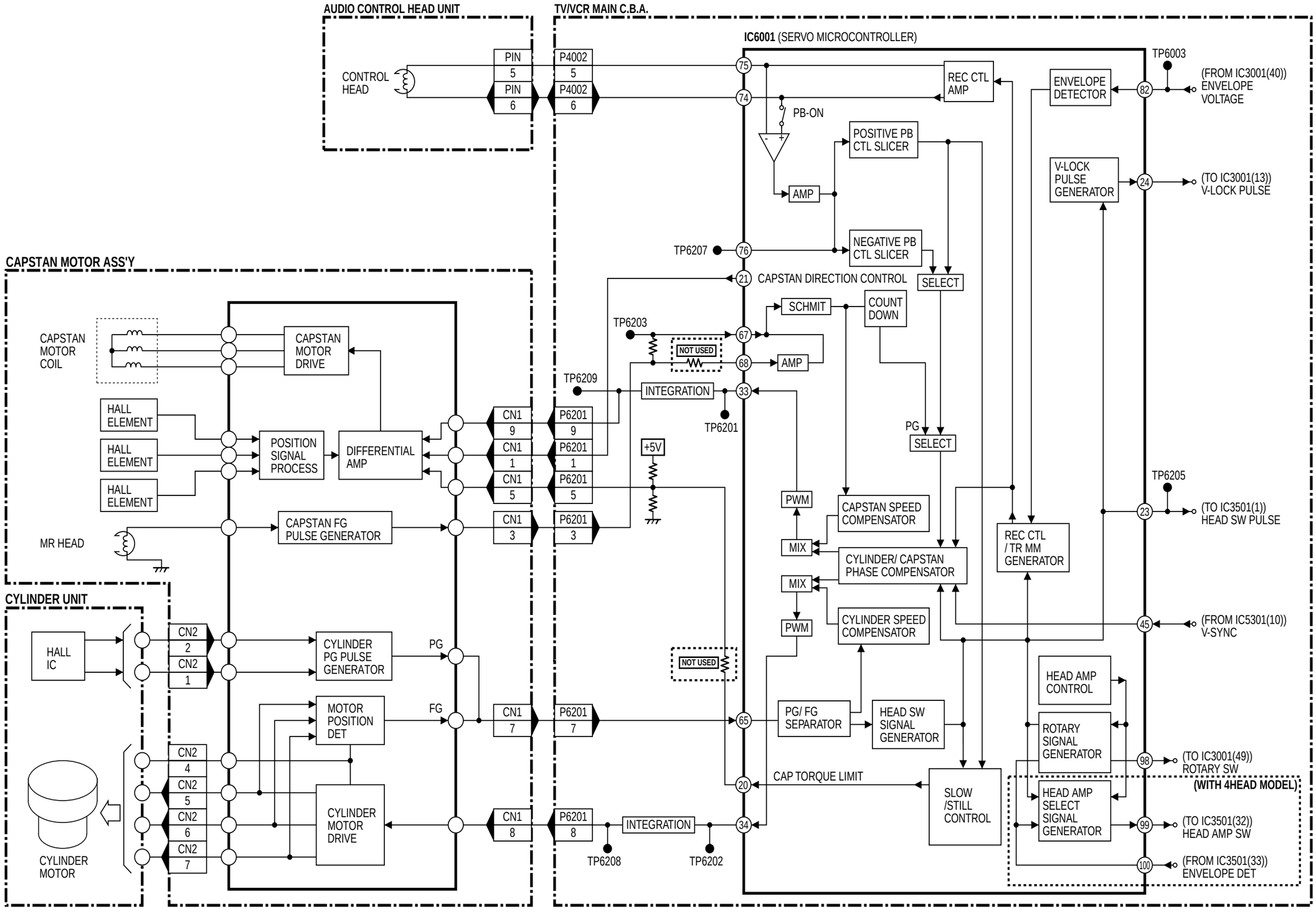


SYSTEM CONTROL BLOCK DIAGRAM



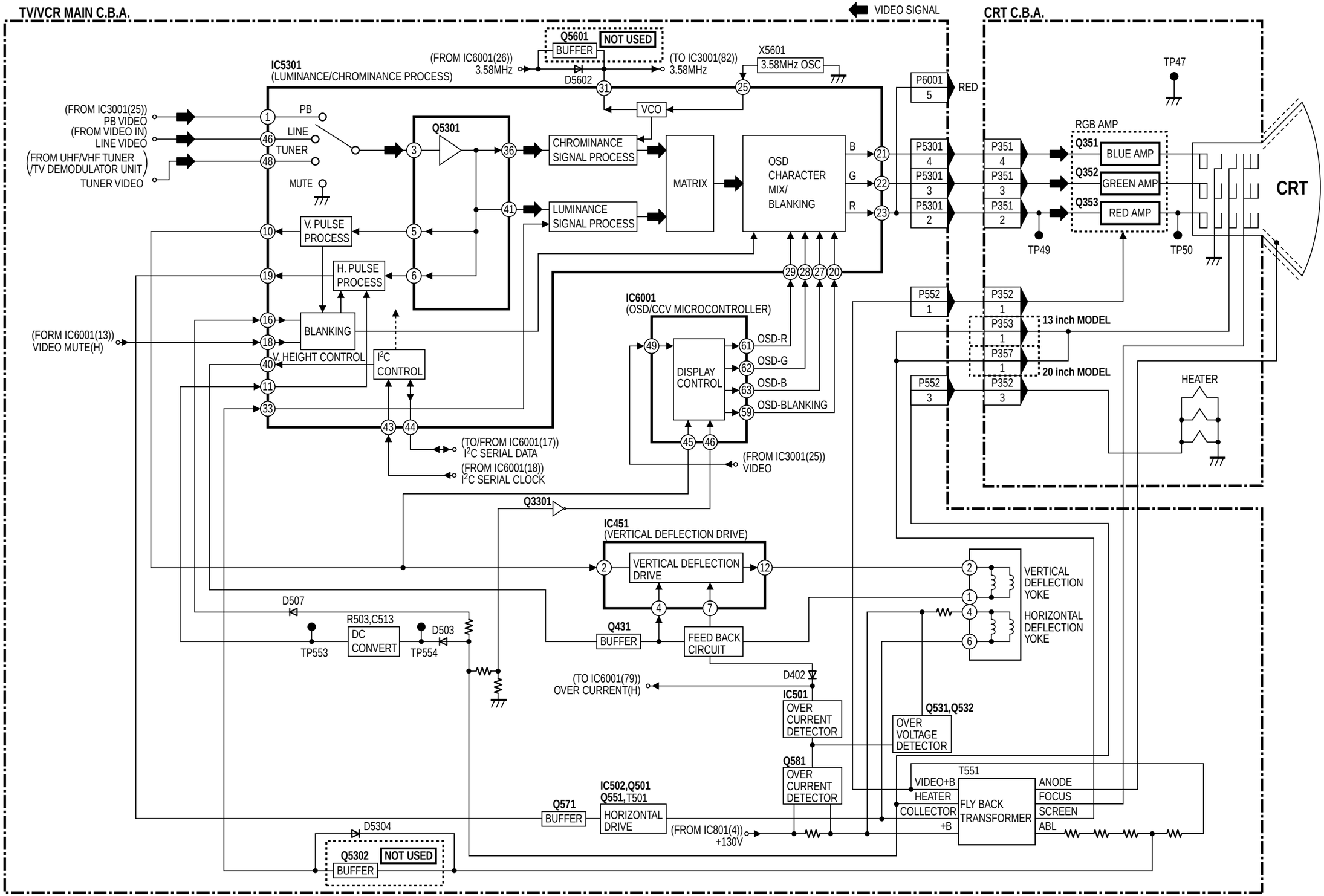
SYSTEM CONTROL BLOCK DIAGRAM
AG-513F/AG-520F

SERVO BLOCK DIAGRAM



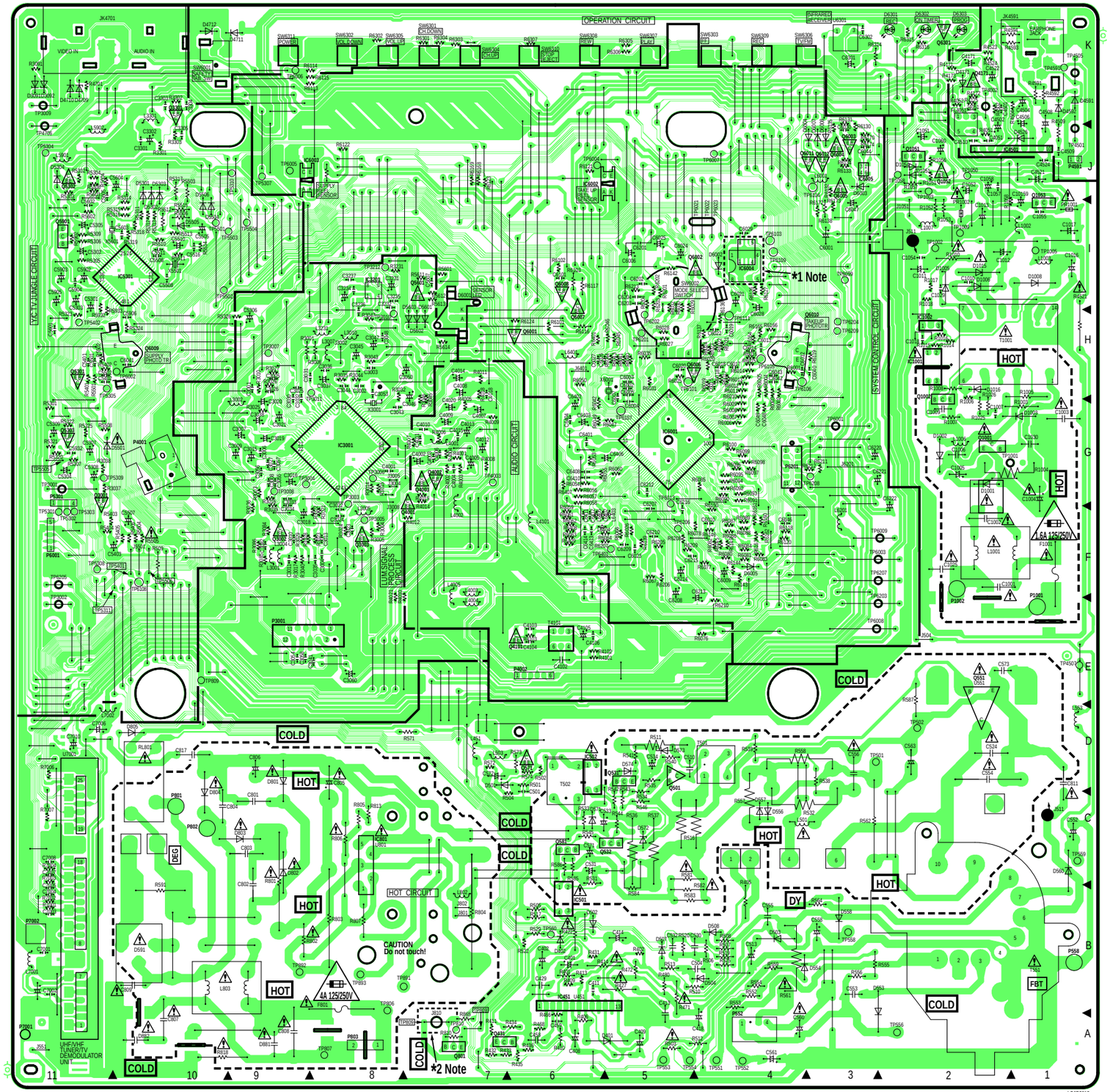
SERVO BLOCK DIAGRAM
AG-513F/AG-520F

TV / Y/C PROCESS BLOCK DIAGRAM



TV / Y/C PROCESS BLOCK DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN C.B.A. LSEP2012X (E) / LSEP2012E (G)



HOT CIRCUIT. BE CAREFUL AND USE AN ISOLATION TRANSFORMER WHEN SERVICING.

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE:
CIRCUIT BOARD LAYOUT SHOWS COMPONENTS INSTALLED FOR VARIOUS MODELS.
FOR PROPER PARTS CONTENT FOR THE MODEL YOU ARE SERVICING, PLEASE REFER TO THE SCHEMATIC DIAGRAM AND PARTS LIST.

NOTE:
CIRCUIT BOARD LAYOUT INCLUDES COMPONENTS WHICH ARE NOT USED.

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD,
REPLACE ONLY WITH THE SAME TYPE 4A 125/250V FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQUES
D' INCENDIE N' UTILISERQUE DES FUSIBLE DE MÉME
TYPE 4A 125/250V

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD,
REPLACE ONLY WITH THE SAME TYPE 1.6A 125/250V FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQUES
D'T INCENDIE N'I UTILISERQUE DES FUSIBLE DE MÉME
TYPE 1.6A 125/250V

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

*1 Note

There are 2 types of EEPROM IC (IC6004) used on the TV/VCR Main C.B.A. (DIP TYPE and SOP TYPE)
However, these are same reliability.

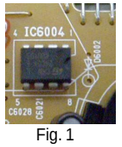


Fig. 1

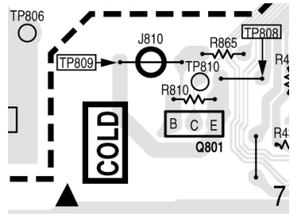
OR

Fig. 2

Be sure to install DIP type IC from the component side as shown in Fig. 1.
Be sure to intall SOP type IC from the foil side as shown in Fig. 2.

*2 Note

When the TV/VCR MAIN CBA is replaced, the Jumper wire(J801 or J810) of the new TV/VCR MAIN CBA must be cut before use.
If the Jumper wire isn't cut, the power does not turned on to the TV circuit.
As for the location of the Jumper wire, please refer the following figure.



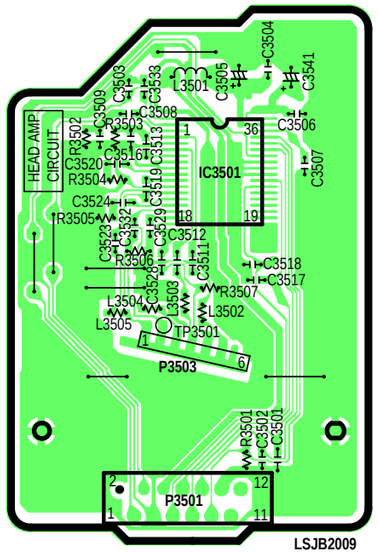
COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K

HEAD AMP C.B.A. LSEP2009A

NOTE:
CIRCUIT BOARD LAYOUT SHOWS COMPONENTS INSTALLED FOR VARIOUS MODELS.
FOR PROPER PARTS CONTENT FOR THE MODEL YOU ARE SERVICING,
PLEASE REFER TO THE SCHEMATIC DIAGRAM AND PARTS LIST.

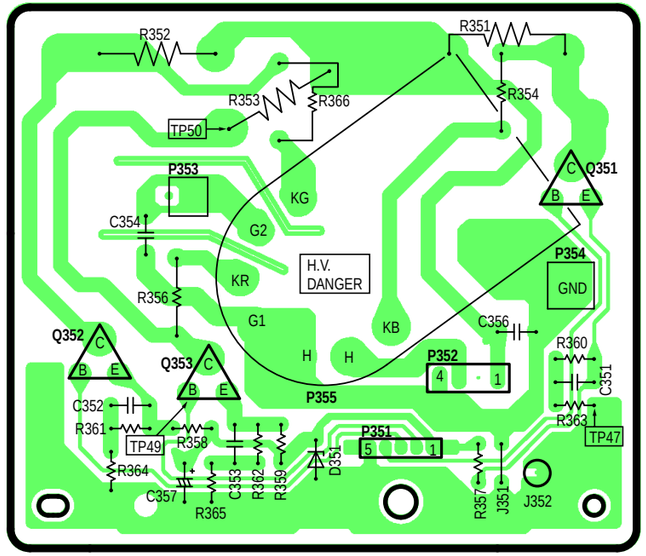
NOTE:
CIRCUIT BOARD LAYOUT INCLUDES COMPONENTS WHICH ARE NOT USED.



CRT C.B.A. LRP63004D (E)

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

CAUTION: WHEN SERVICING THIS C.B.A., AVOID TOUCHING HIGH VOLTAGE COMPONENTS.



NOTE:
CIRCUIT BOARD LAYOUT SHOWS COMPONENTS INSTALLED FOR VARIOUS MODELS.
FOR PROPER PARTS CONTENT FOR THE MODEL YOU ARE SERVICING,
PLEASE REFER TO THE SCHEMATIC DIAGRAM AND PARTS LIST.

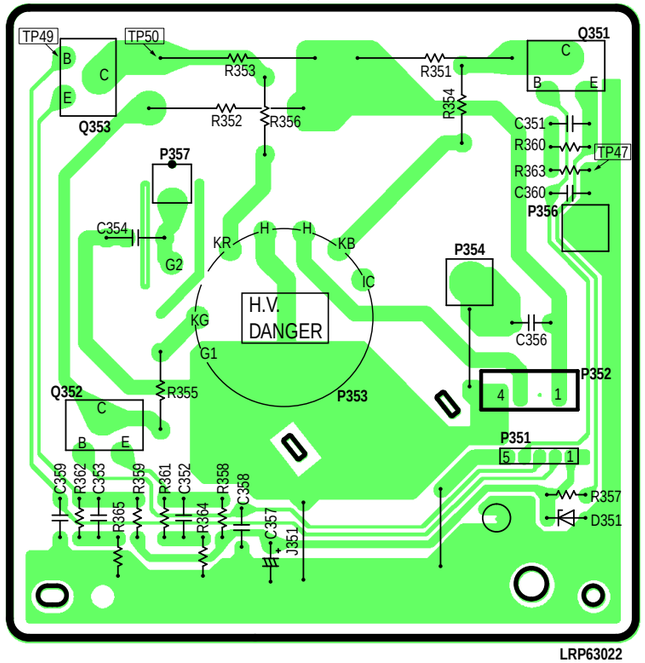
NOTE:
CIRCUIT BOARD LAYOUT INCLUDES COMPONENTS WHICH ARE NOT USED.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K

CRT C.B.A. LRP63022B (G)

CAUTION: WHEN SERVICING THIS C.B.A., AVOID TOUCHING HIGH VOLTAGE COMPONENTS.



NOTE:
CIRCUIT BOARD LAYOUT SHOWS COMPONENTS INSTALLED FOR VARIOUS MODELS.
FOR PROPER PARTS CONTENT FOR THE MODEL YOU ARE SERVICING,
PLEASE REFER TO THE SCHEMATIC DIAGRAM AND PARTS LIST.

NOTE:
CIRCUIT BOARD LAYOUT INCLUDES COMPONENTS WHICH ARE NOT USED.

HEAD AMP C.B.A. LSEP2009A
CRT C.B.A. LRP63004D
CRT C.B.A. LRP63022B
AG-513F/AG-520F

1. **Important safety notice**
   Components identified by the sign ⚠ have special characteristics important for safety. When replacing any of these components. Use only the specified parts.

2. Do not use the part number shown on this drawing for ordering.
   The correct part number and part value is shown in the parts list, and may be slightly different or amended since this drawing was prepared.

3. Use only original replacement parts:
   To maintain original function and reliability of repaired units, use only original replacement parts which are listed with their part numbers in the parts list section of the service manual.

4. Parts different in shape or size may be used.
   However, only interchangeable parts will be supplied as service replacement parts.

5. Test point information
   : Test point with a jumper wire across a hole in P.C.B.
   : Test point with no test pin.
   ▭→ :Test point with a component lead on the foil side.

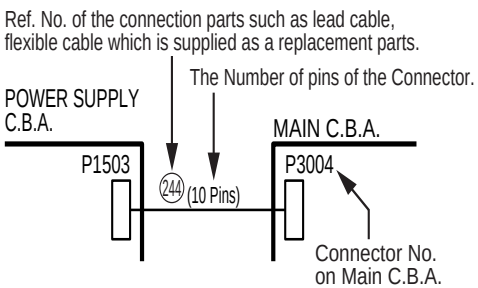
Schematic Diagram Notes

1. Indication for Zener Voltage of Zener Diodes
   The Zener Voltage of Zener Diodes are indicated as such on Schematic Diagrams.

   Example:
   (6.2V).....Zener Voltage

2. How to identify Connectors
   Each connector is labeled with a Connector No. and Pin No. Indicating what it is connected to,
   in other words, its counter part.
   Use the interconnection schematic diagram to find the connection between associated connectors.

   Example:
   The connections between C.B.A.s are shown below.


Ref. No. of the connection parts such as lead cable, flexible cable which is supplied as a replacement parts.
The Number of pins of the Connector.
POWER SUPPLY C.B.A.
MAIN C.B.A.
P1503
244 (10 Pins)
P3004
Connector No. on Main C.B.A.

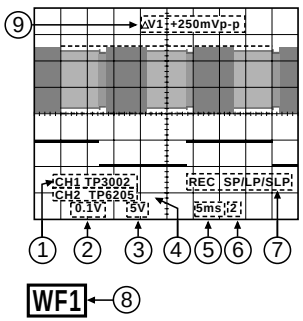
3. Parts marked "PT" are not used in any models included in this service model.

Example: C6011 100P PT | C6011 PT | R6097 PT

4. Jumper wires are used for WA10, WA5 etc and these are not supplied as replacement parts.

Signal Waveform Note

How to read Signal Waveform



① Connecting Point
② Volts/Div
③ Volts/Div
④ Connecting Point
⑤ Time/Div
⑥ Trigger Channel of the scope
(1:CH1,2:CH2)
⑦ Operation Mode of VCR
⑧ Waveform Point on Schematic
⑨ ΔV1:Peak to Peak

Circuit Board Layout Note

Circuit Board Layout shows components installed for various models.
For proper parts content for the model you are servicing, please refer to the schematic diagram and parts list.

NOTE:
Circuit Board Layout includes components which are not used.

Model No. Identification Mark

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT

Note : Refer to item 3 of Schematic Diagram Notes for mark "PT".

TV/VCR MAIN I (SYSTEM CONTROL/SERVO/CCV/OSD/OPERATION) SCHEMATIC DIAGRAM

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES, REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

KEY VOLTAGE CHART (SW6301～6311)

TERMINAL VOLTAGE	0V～0.6V	0.7V～1.9V	2.0V～3.1V
KEY DATA1 (PIN 89)	CH DOWN	VOLUME DOWN	FF/CUE
KEY DATA2 (PIN 88)	CH UP	VOLUME UP	TV/FM
KEY DATA3 (PIN 87)	PLAY /REPEAT	REW /REVIEW	REC/TIME
KEY DATA4 (PIN 86)	STOP/EJECT	-----	POWER

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
---------	A
---------	B
---------	C
---------	D
AG-513F	E
---------	F
AG-520F	G
---------	H
---------	I
---------	J
---------	K
Not Used	PT

CAPSTAN SERVO
CYLINDER SERVO

P6001 IS USED FOR ADJUSTMENT AF FACTORY ONLY NO CONNECTION

IC6005 PST3147NR (RESET)

IC6004 CJ3EBCC000038 (MEMORY)

IC6001 MN101D06GCR (SYSTEM CONTROLSERVO/TIMER /CCV/OSD MICROCONTROLLER

LINK TO I/O CHART

LINK TO SIGNAL WAVEFORM

LINK TO VOLTAGE CHART

LSJB2012
TV/VCR MAIN I SCHEMATIC DIAGRAM
AG-513F/AG-520F

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

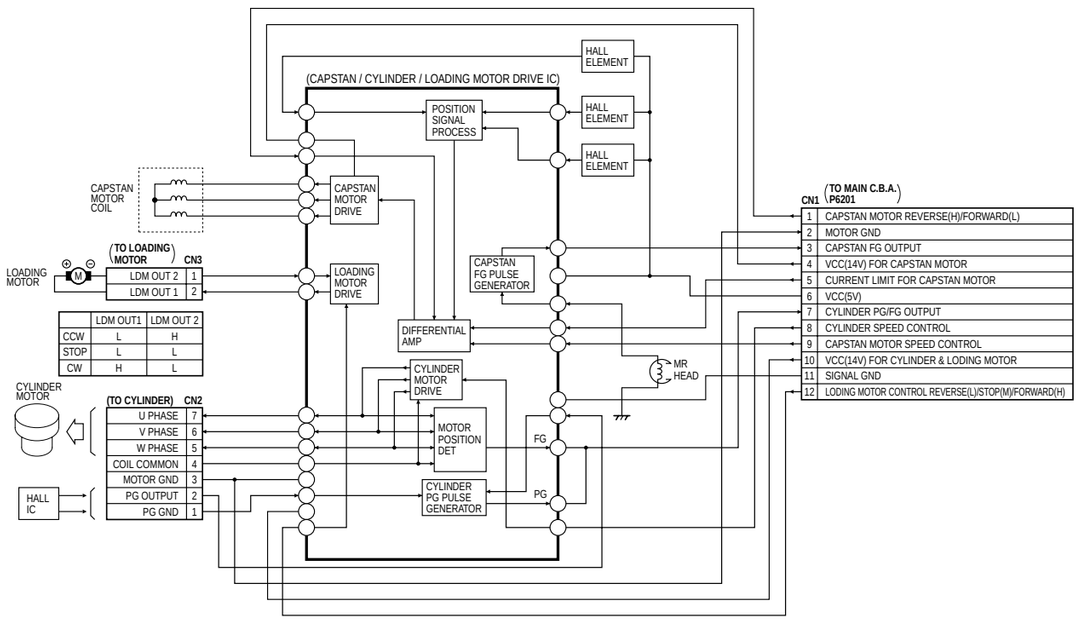
I/O CHART OF IC6001

Pin No.	I/O	Signal Name	Description
1	I	P_DOWN_L	POWER DOWN(L)
2	O	CRSS_L	CUE/REV/SLOW/STILL(L)
3	I	T-REEL	TAKE-UP REEL PULSE
4	I	S-REEL	SUPPLY REEL PULSE
5	I	IR-DATA	IR-DATA
6	O	DEFEAT_H	(Not used)
7	O	A_MUTE_H	AUDIO MUTE(H)
8	I	IIC_SVC_L	I2C SERVICE MODE(L)
9	-	NC	(Not used)
10	O	TUNER_L	(Not used)
11	O	SAP/MAIN	(Not used)
12	O	MONO/MTS	(Not used)
13	O	V_MUTE_H	(Not used)
14	O	SCK	SERIAL CLOCK
15	I	SBIO	(Not used)
16	O	DATA_OUT	SERIAL DATA OUTPUT
17	I/O	IIC_DATA	I2C SERIAL DATA
18	O	IIC_CLK	I2C SERIAL CLOCK
19	I/O	BEEPER	BEEPER
20	-	NC	(Not used)
21	O	CAP_F/R	CAPSTAN MOTOR REVERSE(H)/FORWARD(L)
22	O	BEEP_ON_H	BEEPER ON(H)
23	O	HSW	HEAD SW
24	O	VLP	V-LOCK PULSE
25	I	RST	RESET(L)
26	O	3.58MHz/L	3.58MHz
27	-	NC	(Not used)
28	O	POWER_ON_L	POWER ON(L)
29	O	V_D_REC_H	VIDEO DELAY REC(H)
30	I	LINE_SD_L	TV SIGNAL(L)
31	-	NC	(Not used)
32	O	A_VOLUME	AUDIO VOLUME
33	O	CAP	CAP ERROR
34	O	CYL	CYL ERROR
35	O	SP_MUTE_L	AUDIO AMP MUTE(L)
36	I	DVDD	VDD
37	O	OSC-OUT	OSC 2
38	I	OSC-IN	OSC 1
39	-	DVSS	GND
40	O	TNR_CE_H	TUNER CHIP ENABLE(H)
41	I	TNR_LOCK_L	TUNER LOCK SIGNAL(L)
42	I	SXI	SXI
43	I/O	FM_RAD_F_MONO_H/NOR_I	(Not used)
44	O	TV_P_ON_H	TV POWER ON(H)
45	I	V_SYNC	Y-SYNC
46	I	H_SYNC	H-SYNC
47	-	NC	(Not used)
48	-	VSS2_OSD	GND
49	I	CV_IN1	VIDEO
50	I	CV_IN2	VIDEO

Pin No.	I/O	Signal Name	Description
51	I	VDD2_OSD	VDD
52	I	AFC_C	AFC
53	O	AFC_LPF	AFC
54	O	FM_RAD_H	FM RADIO(H)
55	O	FSC_LPF	FSC
56	I	FM_RAD_STE_L	FM STEREO(L)
57	I	FM_RAD_SD_L	FM SIGNAL(L)
58	O	PLAY_L	PB(L)
59	O	BLK_H	BLANKING PULSE(H)
60	O	LOAD-F/S/R	LOADING MOTOR CONTROL REVERSE(L)/STOP(M)/FORWARD(H)
61	O	R	OSD RED
62	O	G	OSD GREEN
63	O	B	OSD BLUE
64	I	S_TAB_ON_L	SAFETY TAB ON(L)
65	I	Y_PFG	CYL PG/FG
66	I	TNR_SD_L	TUNER SIGNAL(L)
67	O	FGF	CAP FG
68	I	AFG	CAP FG
69	O	VRO	V-REF 1
70	I	VRI	V-REF 2
71	-	AVSS	GND
72	I	CTLA	CTL AMP
73	I	AVDD	VDD
74	I/O	RCTLP	CTL PULSE(+)
75	-	RCTLN	CTL PULSE(-)
76	O	CTL_OUT	PB CONTROL PULSE
77	-	NC	(Not used)
78	I	DTS_AFC	AFC
79	I	OVER_CUR_H	OVER CURRENT(H)
80	I	T-PHOTO/DEBUG_L	TAKE-UP PHOTO TR(L)/SERVICE(L)
81	I	S-PHOTO_L	SUPPLY PHOTO TR(L)
82	I	AT_ENV	ENV-VOLTAGE
83	I	2H/4H/STE/HF/2LC_OPT	SWITCHING TERMINAL OPTION (2HEAD/4HEAD/STEREO)
84	O	RAD/UNIV/aux_OPT	SWITCHING TERMINAL OPTION (FM RADIO/UNIVERSAL)
85	-	NC	(Not used)
86	I	KEY_IN_3	KEY DATA 3
87	I	KEY_IN_2	KEY DATA 2
88	I	KEY_IN_1	KEY DATA 1
89	I	KEY_IN_0	KEY DATA 0
90	O	PR_T_LED	PROGRAM TIMER LED ON(L)
91	O	ON_T_LED	ON TIMER LED ON(L)
92	O	REC_LED	REC LED ON(L)
93	I	SAP_IN_L	(Not used)
94	I	MTS_IN_L	(Not used)
95	I	POS.3	MODE SW POSITION C
96	I	POS.2	MODE SW POSITION B
97	I	POS.1	MODE SW POSITION A
98	O	ROT_SW	ROTARY SW
99	O	HA_SW	HEAD AMP SW
100	I	D_ENV	ENVELOPE DET

CAPSTAN MOTOR ASS'Y

NOTE:
CAPSTAN MOTOR ASS'Y (REF. NO. 46) IS SUPPLIED AS A UNIT ONLY.
HOWEVER, THE FLAT FLEXIBLE CABLE (REF. NO. 48) IS AVAILABLE SEPARATELY AS A REPLACEMENT PART.



TV/VCR MAIN II (SIGNAL PROCESS/AUDIO/DEMODULATOR) SCHEMATIC DIAGRAM

NOTE:
FOR SCHEMATIC DIAGRAM AND CIRCUIT BOARD LAYOUT NOTES,
REFER TO BEGINNING OF SCHEMATIC SECTION.

NOTE: For placing a purchase order of the parts,
be sure to use the part number listed in the parts list.
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IMPORTANT SAFETY NOTICE:
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SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY.
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USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT

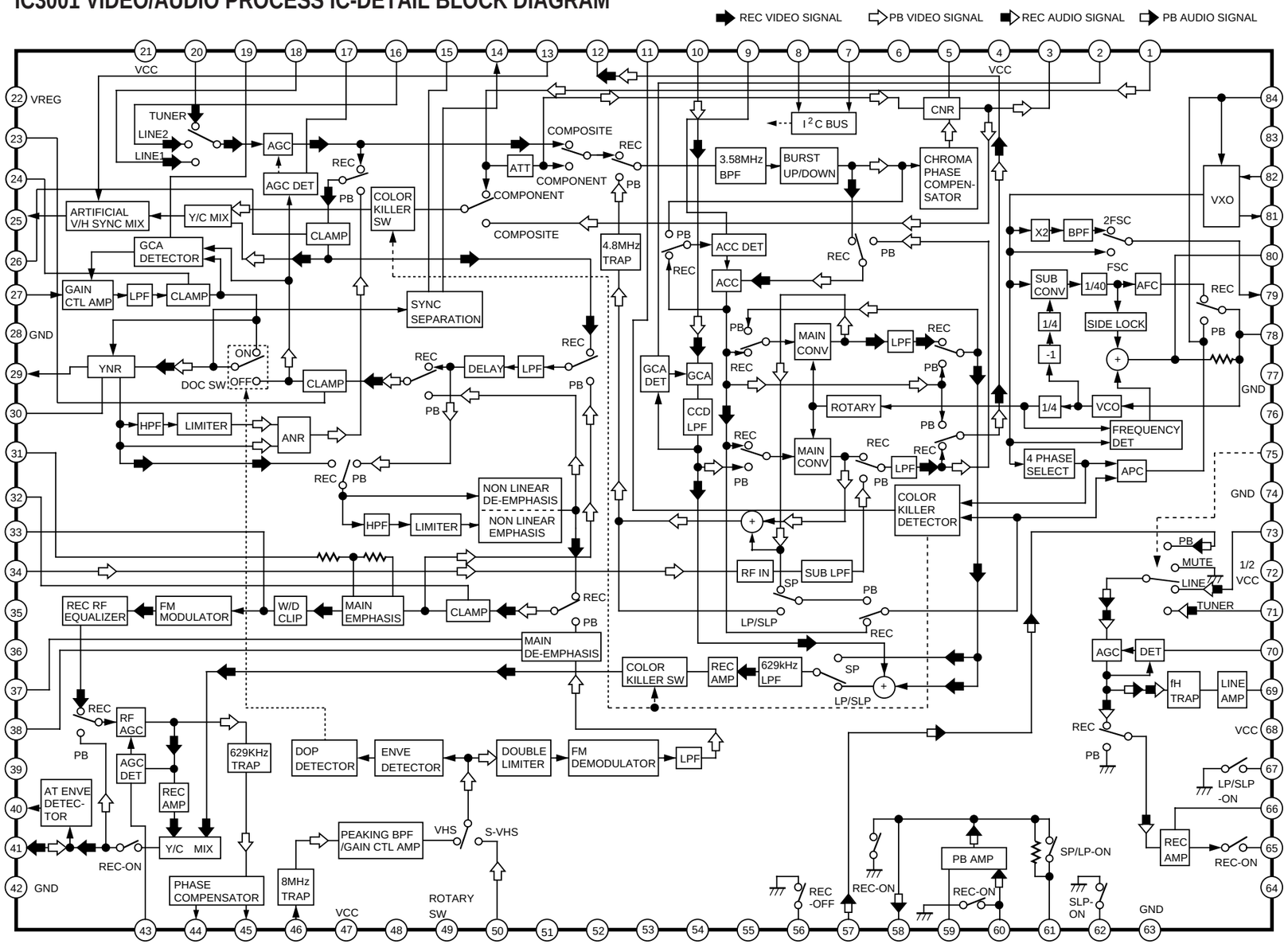
REC VIDEO SIGNAL
REC AUDIO SIGNAL
PB VIDEO SIGNAL
PB AUDIO SIGNAL

LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN II SCHEMATIC DIAGRAM
AG-513F/AG-520F

IC3001 VIDEO/AUDIO PROCESS IC-DETAIL BLOCK DIAGRAM



IC3001 DETAIL BLOCK DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN III (TV Y/C PROCESS) SCHEMATIC DIAGRAM

REC VIDEO SIGNAL　　PB VIDEO SIGNAL

NOTE:
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NOTE: For placing a purchase order of the parts, be sure to use the part number listed in the parts list. Do not use the part number on this diagram.

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY THE SIGN ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE SPECIFIED PARTS.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT

TO M II 49 EXT FSC　TO M I 25 OSD R　TO M I 26 OSD G　TO M I 27 OSD B　TO M I 6 FSC　TO M I 24 VOB

TO M IV 17 SW 12V

TO M I 12 TV POWER ON H

TO M I 5 IIC CLK

TO M I 4 IIC DATA

TO M II 50 EXT KILLER

TO M II 48 LINE VIDEO

TO M II 59 TNR VIDEO

TO M IV 47 SW 5V VIDEO

TO M II 51 VCJ 5V

TO M II 52 VV VIDEO

TO M I 8 LINE SD L

TO M I 3 R OUT

TO CRT C.B.A. P351 A,B,C,D,E,F

TO CRT C.B.A. P351 G,H,I

P5301: 1 SW 12V, 2 R OUT, 3 G OUT, 4 B OUT

TP5301 TP5302 TP5303 TP5304 TP5311 TP5307 TP5308 TP5309 TP5305 TP5310 TP5402 TP5503 TP5502 TP5501 TP5401 TP5506 TP5504 TP5505

Q5601 PT (BUFFER)　Q5302 PT (BUFFER)　Q5901 2SD2259 (+9V REGULATOR)　Q5303 PT SWITCHING TV POWER ON-ON　Q5301 2SD1819A (BUFFER)

IC5301 AN15167A-VT LUMINANCE/ CHROMINANCE PROCESS

WF28 WF27 WF26 WF25 WF24 WF23 WF22 WF21

X5501 CSB503F38　X5601 VSXS0190　J5501 WA7.5　L5902 47U　L5901 100U

D5601 PT　D5602 MA165　D5603 MA165　D5304 WA5　D5501 MA4062-LT　D5506 PT　D5504 PT　D5301 PT　D5302 PT　D5303 PT　D5505 PT

R5601 2700　R5611 22K　C5607 PT　R5613 PT　R5308 56K　R5304 47K　R5309 270K　R5303 PT　R5614 56K　R5302 PT　R5612 22K

C5603 15P　R5604 3300　C5604 1/50V　C5601 0.01　R5318 PT　R5319 PT　R5311 330　R5312 330　R5313 330　R5317 100

R5512 150　R5513 100　R5515 PT　R5506 47K　R5510 100　C5516 0.033　R5503 470　R5514 PT　C5505 47/16V　C5506 0.01　C5511 0.033　C5510 1/50V　R5511 2200

R5603 PT　R5602 PT　C5302 4.7/25V　R5305 220K　R5306 22K　C5305 0.33/50V　C5602 0.1　C5605 0.015　R5314 2700　R5315 2700　R5316 2700

R5902 1K　C5902 47/16V　C5903 47/16V　C5904 0.01　C5303 0.47/50V　C5932 0.01　C5301 10/16V　R5307 0　R5932 100　R5933 100　R5324 100　R5325 PT　C5304 PT　C5306 10/16V　C5307 10/16V　R5326 PT

R5323 PT　R5320 PT　R5321 PT　C5309 PT　R5322 PT

R5502 390K　R5402 390K　C5906 0.01　C5905 100/6.3V　C5308 10/16V　C5402 2200P　C5502 680P　R5403 220　C5401 0.22　C5501 0.018　R5504 100　C5508 220P　C5507 10/16V　R5508 560　R5406 100　R5404 PT　C5403 2.2/50V　R5405 8200　R5505 3240　R5401 560　R5501 470　R5301 220

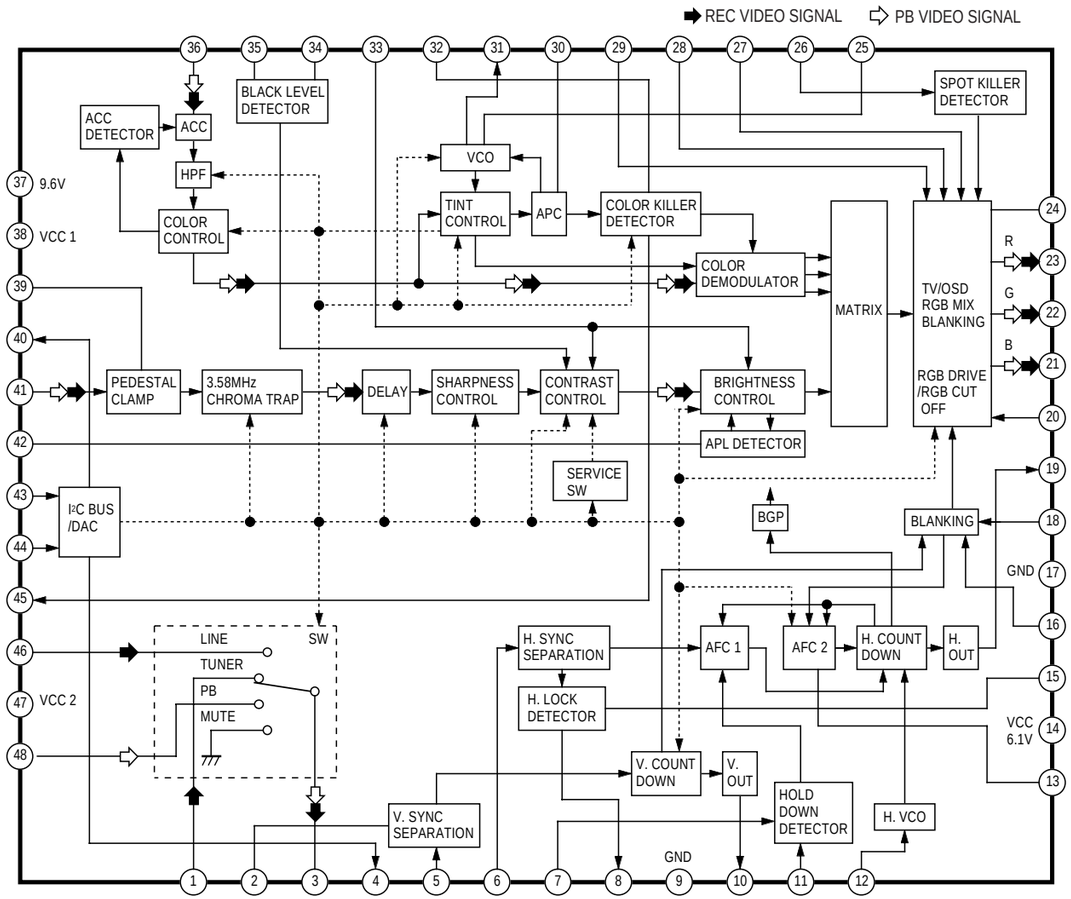
ABL 62 TO M V
V AMP 60 TO M V
H OUT 63 TO M V
V MUTE H 39 TO M I
H AFC 64 TO M V
V PULSE 13 TO M I,M V
HOLD DOWN 61 TO M V
H PULSE 56 TO M V
H&V GND 65 TO M V

LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN III SCHEMATIC DIAGRAM
AG-513F/AG-520F

IC5301 LUMINANCE/CHROMINANCE PROCESS
IC-DETAIL BLOCK DIAGRAM



IC5301 DETAIL BLOCK DIAGRAM
AG-513F/AG-520F

TV/VCR MAIN IV (POWER SUPPLY) SCHEMATIC DIAGRAM

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD,
REPLACE ONLY WITH THE SAME TYPE 4A 125/250V FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQUES
D' INCENDIE N' UTILISERQUE DES FUSIBLE DE MÉME
TYPE 4A 125/250V

CAUTION: FOR CONTINUED PROTECTION AGAINST FIRE HAZARD,
REPLACE ONLY WITH THE SAME TYPE 1.6A 125/250V FUSE.
ATTENTION: POUR UNE PROTECTION CONTINUE LES RISQUES
D'T INCENDIE N'I UTILISERQUE DES FUSIBLE DE MÉME
TYPE 1.6A 125/250V

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NOTE:
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NOTE: For placing a purchase order of the parts,
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Do not use the part number on this diagram.

COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
--------	A
--------	B
--------	C
--------	D
AG-513F	E
--------	F
AG-520F	G
--------	H
--------	I
--------	J
--------	K
Not Used	PT

HOT CIRCUIT. BE CAREFUL AND USE AN ISOLATION TRANSFORMER WHEN SERVICING.

HOT

AC POWER CORD — P803 — AC120V 1 — AC120V 2 — AC120V 3

TP806 PT — ⚠F801 4A 125V/250V — TP807 PT — R818 8.2M

D881 ERZV10V361CS — C808 0.082 — L803 ELF21V018A — C807 JOLE00000023 — D882 ERZV10V361CS — C809 100P

TO M IV 17 SW_12V — TO M I 12 TV_POWER_ON_H — TP808 PT — R865 2200 — J810 WA7.5 — TP809 PT — R810 10K — TP810 PT — Q801 2SC945A (SWITCHING (TV POWER ON-ON) — D805 MA167 — RL801 LSSY0004

C817 PT

C802 4700P — D802 BOAAKT000010 — D801 BOAAKT000010 — D803 BOAAKT000010 — D804 BOAAKT000010 — C804 4700P — C801 4700P — R801 0.82/3W — C803 4700P — C805 220/200V A,B,C,D,E,F 470/180V G,H,I — R803 WA30 — R802 10K — R805 100K — R813 100K — R806 47 — C806 10/250V A,B,C,D,E,F 22/250V G,H,I — R807 WA10 — IC801 CSHABZZ00051 (+130V REGULATOR) — TP892 PT — R804 330/10W A,B,C,D,E,F 180/15W G,H,I — TP891 PT — J801 WA5 — J802 WA5 — L802 PT — TP893 PT

+130V 66 TO M V

HOT_GND 67 TO M V

⚠DEGAUSSING COIL — DEG — R591 PT 120/5W — D591 D4DDF5R00002 — J593 PT — J592 WA20

P801 AC 120V — P802 AC 120V — P1001 AC 120V — P1002 AC 120V

⚠F1001 1.6A 125V/250V — 1.6A 125V/250V — C1001 0.01 — C1002 3300P — C1025 100P — C1003 1000P — ⚠L1001 ELF15N005A — ⚠C1004 120/200V — ⚠D1001 DB105G — ⚠T1001 ETS28AD2J3AC

R1004 33K/2W — C1005 4.7/200V — C1006 220P — D1002 ERA18-04 — L1006 VLPS0083 — WF36

R1003 330K — Q1002 2SD1458 (SWITCHING CONTROL) — R1005 56 — C1030 0.018 — WF41 — C1009 0.018 — TP1001 WA7.5 — Q1001 2SC4533LPKT (SWITCHING) — D1003 ERA18-04 — R1026 30 — C1007 0.22 — R1025 30 — WF37 — R1008 3900 — R1006 2200 — D1016 MA165 — R1007 100

⚠IC1001 CNC1S101R1KT (ERROR VOLTAGE DET)

WF38 — C1029 100P — D1005 ERA18-04 — R1010 10 — C1011 47/50V

WF39 — C1010 1000P — D1006 ERC30-01 — C1012 330/18V — D1015 MA2180LA (18V) — L1002 22U — PR1002 UNH000600A — C1013 330/25V — L1007 100U — TP1002 PT — TP1003 PT

WF40 — D1008 ERB81-004 — C1016 330/18V — C1017 1000/6.3V — L1003 10U — PR1001 UNH000600A — TP1005 PT — C1052 10/16V

R1014 220 — R1015 2200 — C1018 0.1 — R1016 1K — ⚠IC1002 TA76431AS (SHUNT REGULATOR) — R1017 2430 — R1018 2200 — TP1009 PT

J1051 WA5 — Q1051 2SD2159 (+12V REGULATOR) — D1054 PT — C1051 0.47/50V — TP1058 PT — R1052 15K — R1053 15K — Q1052 2SD601ARS (SWITCHING CONTROL) — D1051 MA4110N-HTA (11V) — C1060 47/16V — C1054 PT — R1051 1200 — R1056 PT — TP1050 PT — Q1053 2SD2358 2SD2097 (SWITCHING POWER ON+5V) — C1055 PT — C1057 PT — C1058 100/6.3V — R1057 330 — R1058 100K — C1059 47/16V

UNSW_30V 55 TO M II

UNSW_14V 19 TO M I

SW_12V 17 TO M I,M III,M IV,M V

SW_12V_HA 54 TO M II

POWER_ON_L 7 TO M I

UNSW_5V_SYSCON 1 TO M I,M II

SW_5V_VIDEO 47 TO M I,M II,M III

GND_FBT 68 TO M V

GND_TV 69 TO M V

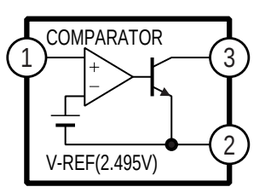
GND_SYSCON 2 TO M I

MOTOR_GND 20 TO M I

GND_S_TAB 34 TO M II

GND_CYL 53 TO M II

IC1002 SHUNT REGULATOR IC- DETAIL BLOCK DIAGRAM



LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

TV/VCR MAIN V (TV) SCHEMATIC DIAGRAM

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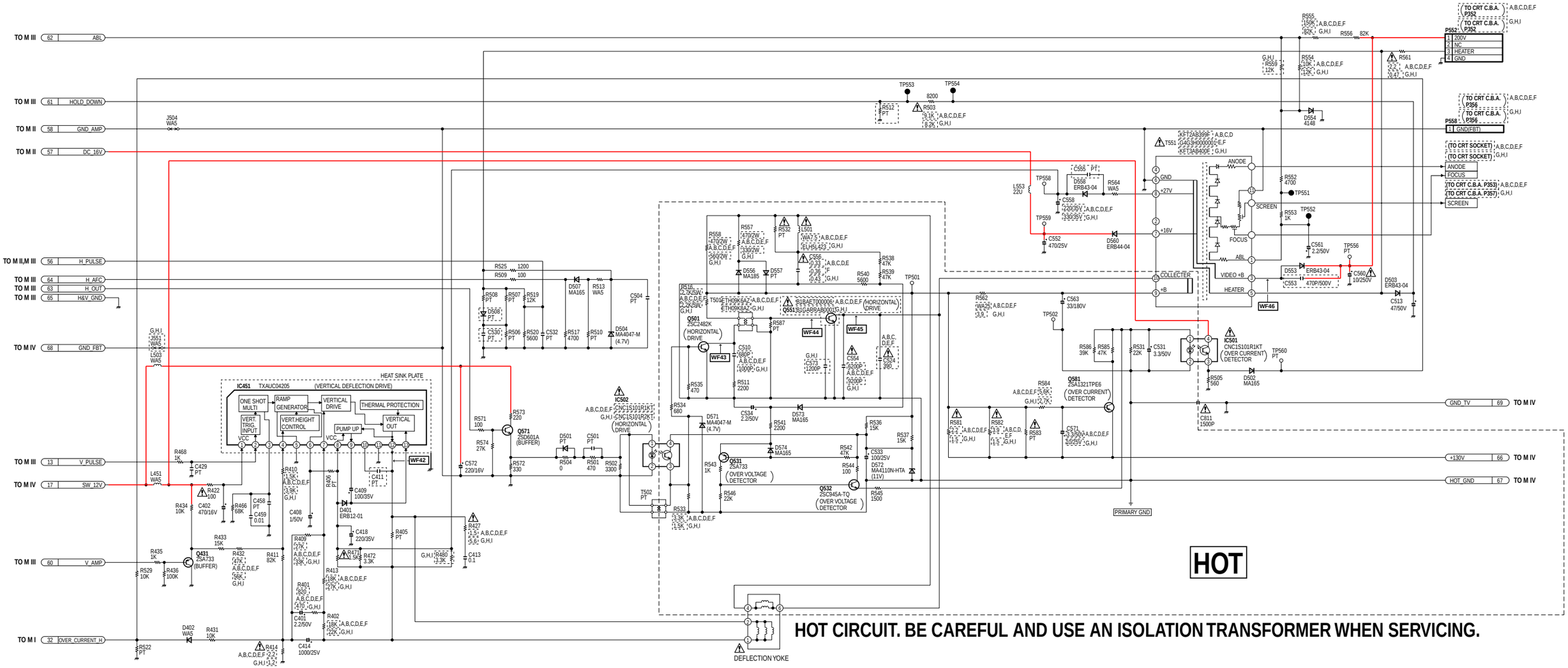
COMPARISON CHART OF MODELS & MARKS

MODEL	MARK
- - - - - - - -	A
- - - - - - - -	B
- - - - - - - -	C
- - - - - - - -	D
AG-513F	E
- - - - - - - -	F
AG-520F	G
- - - - - - - -	H
- - - - - - - -	I
- - - - - - - -	J
- - - - - - - -	K
Not Used	PT



HOT

HOT CIRCUIT. BE CAREFUL AND USE AN ISOLATION TRANSFORMER WHEN SERVICING.

LINK TO VOLTAGE CHART

LINK TO SIGNAL WAVEFORM

LSJB2012
TV/VCR MAIN V SCHEMATIC DIAGRAM
AG-513F/AG-520F